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# Family Economics and Nutrition Review

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## Expenditures on Children by Families, 1995

By Mark Lino  
Economist  
Center for Nutrition Policy and Promotion

Since 1960, the U.S. Department of Agriculture has provided estimates of expenditures on children from birth through age 17. This article presents the most recent estimates for husband-wife and single-parent families using data from the 1990-92 Consumer Expenditure Survey, updated to 1995 dollars using the Consumer Price Index. Data and methods used in calculating child-rearing expenses are described. Estimates are provided for major components of the budget by age of child, family income, and region of residence. Expenses on the younger child in a two-child, husband-wife household for the overall United States averaged between \$5,490 and \$12,550 per year, depending on the child's age and family income group. Adjustment factors for number of children in the household are also provided. Results of this study can be used in developing State child support guidelines and foster care payments as well as in family educational programs.

**S**ince 1960, the U.S. Department of Agriculture (USDA) has provided estimates of expenditures on children from birth through age 17. These estimates are used in setting child support guidelines, foster care payments, and in educational programs on parenthood. This study presents the latest child-rearing expense estimates, which are based on 1990-92 expenditure data updated to 1995 dollars. The study presents these new estimates for husband-wife and single-parent families. It briefly describes the data and methods used in calculating child-rearing expenses<sup>1</sup> and then discusses the estimated expenses.

The estimates are provided for the United States overall. To partially adjust for price differentials and varying patterns of expenditures, the child-rearing expense estimates for husband-wife families are also provided for urban areas in four regions (Northeast, South, Midwest, and West) and rural areas throughout the United States.<sup>2</sup> For single-parent families, estimates are

<sup>1</sup>The report "Expenditures on Children by Families: 1995 Annual Report" provides a more detailed description of the data and methodology. To obtain a copy, contact: USDA, Center for Nutrition Policy and Promotion, 1120 20th Street NW, Suite 200 North Lobby, Washington, DC 20036 (Telephone Number: 202-208-2417).

<sup>2</sup>Urban areas are defined as Metropolitan Statistical Areas (MSA's) and other places of 2,500 or more people outside an MSA; rural areas are places of less than 2,500 people outside an MSA.



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## Categories of Household Expenditures

*Housing expenses* include shelter (mortgage interest, property taxes, or rent; maintenance and repairs; and insurance), utilities (gas, electricity, fuel, telephone, and water), and house furnishings and equipment (furniture, floor coverings, major appliances, and small appliances). It should be noted that for homeowners, housing expenses do not include mortgage principal payments; such payments are considered in the Consumer Expenditure Survey to be part of savings. So, total dollars allocated to housing by homeowners are underestimated in this report.

*Food expenses* include food and nonalcoholic beverages purchased at grocery, convenience, and specialty stores, including purchases with food stamps; dining at restaurants; and household expenditures on school meals.

*Transportation expenses* include the net outlay on purchase of new and used vehicles, vehicle finance charges, gasoline and motor oil, maintenance and repairs, insurance, and public transportation.

*Clothing expenses* include children's apparel such as diapers, shirts, pants, dresses, and suits; footwear; and clothing services such as dry cleaning, alterations and repair, and storage.

*Health care expenses* include medical and dental services not covered by insurance, prescription drugs and medical supplies not covered by insurance, and health insurance premiums not paid by employer or other organization.

*Child care and education expenses* include day care tuition and supplies; baby-sitting; and elementary and high school tuition, books, and supplies.

*Miscellaneous expenses* include personal care items, entertainment, and reading materials.

provided only for the United States overall because of sample size limitations. Expenditures on children are estimated for the major budgetary components: Housing, food, transportation, clothing, health care, child care and education, and miscellaneous goods and services. The box shown above describes each expenditure component.

### Source of Data

Data used to estimate expenditures on children are from the 1990-92 Consumer Expenditure Survey (CE), administered by the Bureau of Labor Statistics (BLS). The CE collects information on socio-demographic characteristics and income of households as well as expenditures.

The CE has been conducted annually since 1980 and interviews about 5,000 households each quarter over a 1-year period. Each quarter is deemed an independent sample by BLS, bringing the total number of households in the 1990-92 survey to about 60,000.

From these households, husband-wife and single-parent families were selected for this study if: (1) they had at least one child of their own, age 17 or under, in the household, (2) they had six or fewer children, (3) there were no other related or unrelated people present in the household except their own children, and (4) they were complete income reporters. Complete income reporters are households that provide values for

major sources of income, such as wages and salaries, self-employment income, and Social Security income. Quarterly expenditures were annualized. The sample consisted of 12,850 husband-wife households and 3,395 single-parent households and was weighted to reflect the U.S. population of interest, using BLS weighting methods. Although based on 1990-92 data, the expense estimates were updated to 1995 dollars using the Consumer Price Index (CPI-U) (1990 and 1991 expenditure and income data were first converted to 1992 dollars; then all 3 years of data were updated to 1995 dollars).

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## Methodology

The CE collects overall household expenditure data for some budgetary components (housing, food, transportation, health care, and miscellaneous goods and services) and child-specific expenditure data for other components (clothing, child care, and education). Multivariate analysis was used to estimate household and child-specific expenditures, controlling for income level, family size, and age of the younger child so estimates could be made for families with these varying characteristics. Regional estimates were derived by controlling for region. The three income groups of husband-wife households (before-tax income under \$31,000, between \$31,000 and \$52,160, and over \$52,160 in 1992 dollars) were determined by dividing the sample for the overall United States into equal thirds.

For each income level, the estimates were for husband-wife families with two children, with the younger child in one of six age categories (0-2, 3-5, 6-8, 9-11, 12-14, and 15-17 years). Households with four members (two children) were selected as the standard since this was the average size of two-parent families in 1990-92. The focus was on the younger child in a household since the older child was sometimes over age 17.

It should be noted that the estimates are based on CE interviews of households with and without specific expenses; so for some families, expenditures may be higher or lower than the mean estimates, depending on whether they incur the expense or not. This particularly applies to child care and education for which about 50 percent of families in the study had no expenditure. Also, the estimates only cover out-of-pocket expenditures on children made by the parents and not

by others such as grandparents or friends. For example, the value of clothing gifts to children from grandparents would not be included in clothing expenses. On the other hand, some of the expenditures reported by parents may be gifts for children other than their own.

Regional income categories are based on the national income categories in 1992 dollars, updated to 1995 dollars using regional CPI's. The regional income categories are not divided into equal thirds for each region. As previously mentioned, the three income categories were calculated for the overall United States by dividing the sample into equal thirds.

After the various overall household and child-specific expenditures were estimated, these total amounts were allocated among the four family members (husband, wife, older child, and younger child). The estimated expenditures for clothing and child care and education were only for children. It was assumed that these expenses were equally allocated to each child so the estimated expenditures were divided by two (the number of children in the household).

Because the CE did not collect expenditures on food and health care by family member, data from other Federal studies were used to apportion these budgetary components to children by age. Food budget shares as a percentage of total food expenditures, for the younger child in a husband-wife household with two children, were determined using the 1994 USDA food plans (8). These shares were estimated by age of the child and household income level. The food budget shares were then applied to estimated household food expenditures to determine food expenses on children. Health care shares as a percentage of

total health care expenses for the younger child in a husband-wife household with two children were calculated from the 1987 National Medical Expenditure Survey (NMES) (5). These shares were estimated by age of the child and applied to estimated household health care expenditures to determine expenses on children.

Unlike food and health care, no research base exists for allocating estimated household expenditures on housing, transportation, and miscellaneous goods and services among individual household members. Two of the most common approaches for allocating these expenses are the marginal cost method and the per capita method.

The marginal cost method measures expenditures on children as the difference in expenses between couples with children and equivalent childless couples. The method depends on development of an equivalency measure; however, there is no universally accepted measure. Various methods have been proposed, each yielding different estimates of expenditures on children.<sup>3</sup> Some of the marginal cost approaches assume that parents do not alter their expenditures on themselves after a child is added to a household. In addition, couples without children often buy homes larger than they need at the time of purchase in anticipation of children. Comparing the expenditures of these couples to similar couples with children could lead to underestimates of expenditures on children.

<sup>3</sup>For a review of equivalency measures and estimates of expenditures on children resulting from them, see U.S. Department of Health and Human Services, Administration for Children and Families, 1990, *Estimates of Expenditures on Children and Child Support Guidelines* (10).

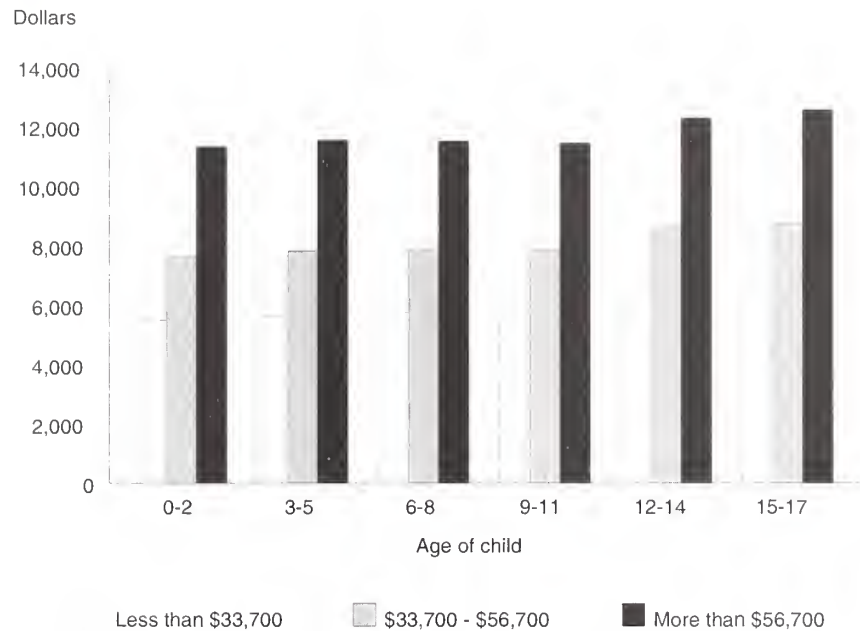


For these reasons, the USDA uses the per capita method to allocate housing, transportation, and miscellaneous goods and services among household members. The per capita method simply allocates expenses among household members in equal proportions. Although the per capita method has its limitations, these limitations were considered less severe than those of the marginal cost approach.

A major limitation of the per capita method is that expenditures for an additional child may be less than average expenditures. Because of this, adjustment formulas for cases of one child or three or more children were devised for use when estimating expenditures on children for households of different sizes. These formulas are discussed later on. Transportation expenses resulting from employment activities are not related to expenses on children, so these costs were excluded from the estimated household transportation expenses using data from a 1990 study by the U.S. Department of Transportation (11).

Although the USDA utilizes the per capita approach rather than a marginal cost approach in allocating housing, transportation, and miscellaneous expenditures to children in a household, a USDA study (6) examined how these expenses would be allocated using different marginal cost approaches. These approaches produced estimates of expenditures on children for housing and miscellaneous goods and services **below**—and estimates of transportation expenditures on children **above**—those produced by the per capita method.

**Figure 1. Estimated 1995 annual family expenditures on a child, by before-tax income level and age of child<sup>1</sup>**



<sup>1</sup>U.S. average for the younger child in husband-wife families with two children.

### Estimated Expenditures on Children by Husband-Wife Households

Estimates of family expenditures on the younger child in husband-wife households with two children for the overall United States, urban regions of the country, and overall rural areas are presented in tables 2 through 7 on pp. 14-20. Income levels of households were updated to 1995 dollars using the all-items category of the CPI-U, and expenditures were updated using the CPI for the corresponding item (that is, the CPI's for housing, food, etc.). Regional estimates were updated to 1995 dollars using the regional CPI's. Given the large amount of information

in the tables, the following subsections highlight the child-rearing expense estimates for the younger child in a two-child household for the overall United States by income level, budgetary component, and age of the child, as well as expense estimates by region.

#### Income Level

Estimated expenses on children vary considerably by household income level (fig. 1). Depending on age of the child, the annual expenses range from \$5,490 to \$6,560 for families in the lowest income group (1995 before-tax income less than \$33,700), from \$7,610 to \$8,710 for families in the middle-income group (1995 before-tax income between \$33,700 and \$56,700), and from \$11,320 to \$12,550 for families in the highest

**As a proportion of total child-rearing expenses, housing accounts for the largest share...**

income group (1995 before-tax income more than \$56,700). On average, households in the lowest group spend 28 percent of their before-tax income per year on a child, those in the middle-income group, 18 percent, and those in the highest income group, 14 percent. The range in these percentages would be narrower if after-tax income were considered, since a greater proportion of income in higher income households goes toward taxes.

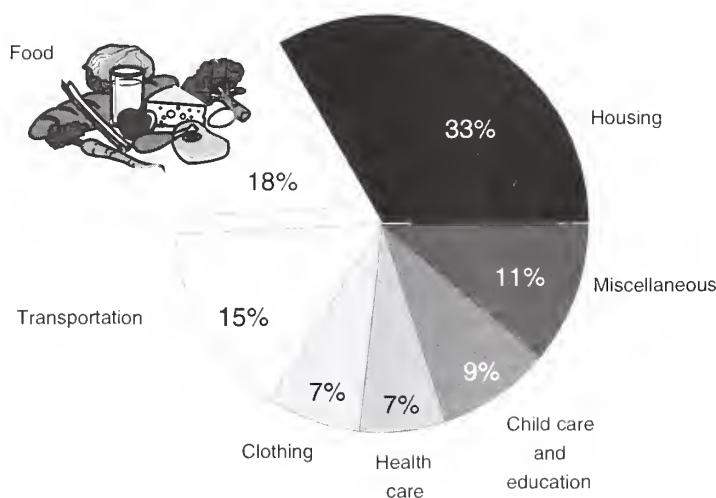
Although families in the highest income group spend slightly less than twice the amount that families in the lowest income group spend on a child, on average, the amount varies by budgetary component. In general, expenses on a child for goods and services considered to be necessities (such as food and clothing) do not

vary as much as those considered to be discretionary (such as miscellaneous expenses) among households in the three income groups. For example, clothing expenses on a child age 15-17 average \$670 in the lowest income group and \$1,010 in the highest income group, a 51-percent difference. Miscellaneous expenses on the same age child average \$560 in the lowest income group and \$1,420 in the highest income group, a 154-percent difference.

#### **Budgetary Component**

As a proportion of total child-rearing expenses, housing accounts for the largest share; figure 2 shows this for families in the middle-income group. Based on an average for the six age groups, housing accounts for 33 percent of child-rearing expenses for a child in

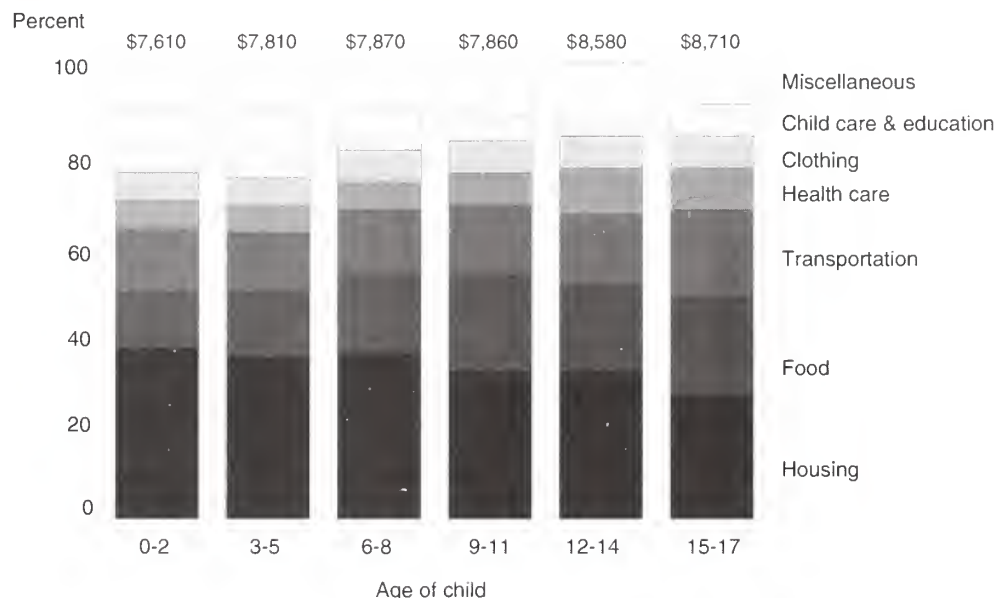
**Figure 2. Estimated family expenditures on a child through age 17, by budgetary share<sup>1</sup>**



Total Expenditures in 1995 dollars = \$145,320

<sup>1</sup>Estimates are for the younger child in middle-income (1995 before-tax income between \$33,700 and \$56,700), husband-wife families with two children.

**Figure 3. Estimated 1995 annual family expenditures on a child, by age and budgetary share<sup>1</sup>**



<sup>1</sup>U.S. average for the younger child in middle-income (1995 before-tax income between \$33,700 and \$56,700), husband-wife families with two children.

the lowest and middle-income groups and 37 percent in the highest income group. Food is the second largest average expense on a child for families regardless of income level, accounting for 20 percent of child-rearing expenses for a child in the lowest income group, 18 percent in the middle-income group, and 15 percent in the highest income group. Transportation is the third largest child-rearing expense, making up 14 to 15 percent of child-rearing expenses across income levels.

Miscellaneous goods and services (personal care items, entertainment, and reading materials) is the fourth largest expense on a child for families in all income groups. Clothing accounts for 6 to 8 percent of expenses on a child for families in the three income groups.

These estimates of children's clothing expenses do not include clothing received in the form of gifts or hand-me-downs. Child care and education are 7 to 10 percent and health care, 5 to 7 percent of child-rearing expenses across income groups. For health care, these estimated expenditures include only out-of-pocket expenses and not that portion covered by health insurance.

#### **Age of Child**

Expenditures on a child are lower in the younger age categories and higher in the older age categories. This held across income groups (fig. 3 depicts this for families in the middle-income group) even though housing expenses, the highest child-rearing expenditure, generally decline as the child grows older. The decline in housing expenses

reflects diminishing interest paid by homeowners over the life of a mortgage. Payments on principal are not considered part of housing costs in the CE; they are deemed to be part of savings.

Child-rearing food, transportation, clothing, and health care expenses generally increase over the age of a child for all three income groups. Transportation expenses are highest for a child age 15-17, when he or she would start driving. Child care and education expenses are highest for a child under age 6. Most of this expense may be attributable to child care at this age. The estimated expense for child care and education may seem low for those with the expense. However, as previously discussed, the estimates reflect the average of households with and without the expense.

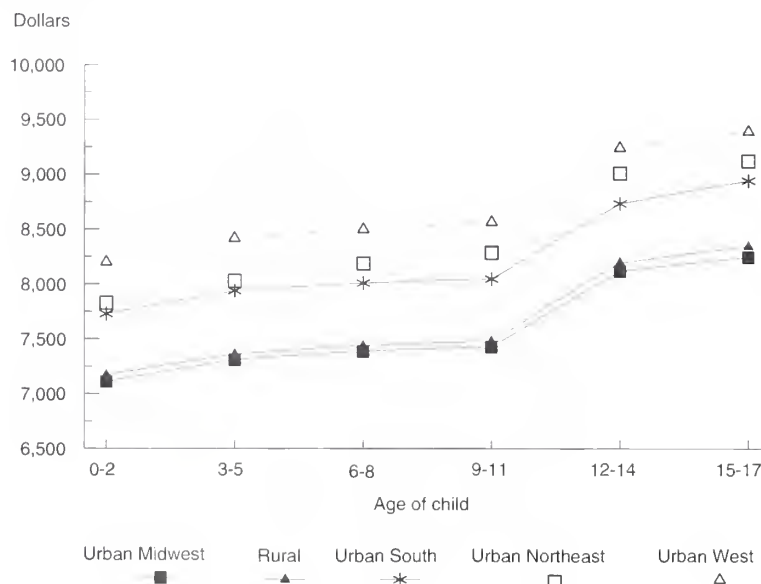
## Region

Child-rearing expenses in the various regions of the country reflect patterns observed in the United States overall. In each region, expenses on a child increase with income level of the household and, generally, with age of the child. Overall child-rearing expenses are highest in the urban West, followed by the urban Northeast, and urban South; figure 4 shows total child-rearing expenses by region and age of a child for middle-income families. Child-rearing expenses are lowest in the urban Midwest and rural areas. Much of the difference in expenses on a child among regions is related to housing costs. Total housing expenses on a child are highest in the urban West and urban Northeast and lowest in rural areas. However, child-rearing transportation expenses are highest for families in rural areas. This likely reflects the longer distances that must be traveled and the lack of public transportation in these areas.

## Adjustments for Older Children and Household Size

The expense estimates on a child represent expenditures on the younger child at various ages in a husband-wife household with two children. It cannot be assumed that expenses on the older child are the same at these various ages. Expenses may vary by birth order. To determine whether a difference exists, the extent of this difference, and how the expenditures may be adjusted to estimate expenses on an older child, the method described on pp. 4-5 was repeated, with the focus being on the older child in each of the same age categories as used with the younger child. A family with two children was again used as the standard. Household income and region of residence were not held constant, so findings are applicable to all families.

**Figure 4. Estimated 1995 annual family expenditures on a child, by region and age<sup>1</sup>**



<sup>1</sup>U.S. average for the younger child in middle-income, husband-wife families with two children. For the urban West, the middle-income group had a 1995 before-tax income between \$33,500 and \$56,400; for the urban Northeast, between \$33,500 and \$56,300; for the urban South, between \$33,800 and \$56,900; for the urban Midwest, between \$33,800 and \$56,900; and for rural areas, between \$34,000 and \$57,200.

It was found that, on average, husband-wife households with two children spend about the same amount on a younger and older child (except for differences caused by age). So, the figures in tables 2 through 7 reflect expenditures on either child in a two-child family. Thus, annual expenditures on children in a husband-wife, two-child family may be estimated by summing the expenses for the two appropriate age categories. For example, annual expenditures on children ages 9-11 and 15-17 in a husband-wife family in the middle income group for the overall United States would be \$16,570 (\$7,860 + \$8,710). It should be noted that for specific budgetary components, annual expenses on an older child vary, compared with those

on a younger child. Families spend more on clothing and education for an older child, but less on transportation.

The estimates should also be adjusted if a household has only one child or more than two children. Families will spend more or less on a child depending on the number of other children in the household and economies of scale. To derive these adjustments, multivariate analysis was used to estimate expenditures for each budgetary component controlling for household size and age of the younger child, but not household income level and region of the country, so the results are applicable to all families.



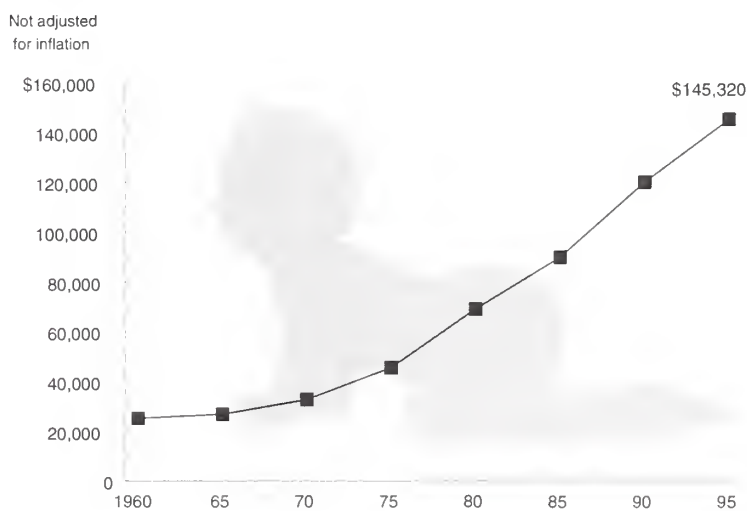
## Expenditures on Children Over Time

Since 1960, the U.S. Department of Agriculture (USDA) has been providing estimates of expenditures on children from birth through age 17. The original estimates were based on the 1960 Consumer Expenditure Survey. The figure below examines how these expenditure estimates have changed over time at 5-year intervals. Depicted are the average total expenditures on a child from birth through age 17 in a middle-income husband-wife family. Expenditures are in nominal (not adjusted for inflation) dollars.

Expenses to raise a child to age 18 have dramatically increased, from \$25,230 in 1960 to \$145,320 in 1995. Even when adjusted for inflation and converted into 1995 dollars, real expenditures on children have risen—from approximately \$129,900 in 1960. Among factors causing this increase are new components of child-rearing costs, particularly child care. In 1960, child care expenses were negligible as many mothers were not in the labor force. In 1995, child care expenses were among the largest expenditures made on preschool children by middle-income families.

The original intent of USDA's research on expenditures on children was primarily educational: expenditure estimates on child-rearing were to be used in financial planning guides and budgeting programs. Although still used for this purpose, the child-rearing expense estimates have gained new applications, such as in developing State child support guidelines and foster care payments. These new uses of the child-rearing expense estimates reflect the changing structure of families with children in the United States and thus, the importance of the ongoing nature of this area of research.

### Total expenditures on a child for the first 18 years of life<sup>1</sup>



<sup>1</sup>Average expenditures for a middle-income husband-wife family, not adjusted for inflation.

These expenditures were then assigned to a child using the method previously described. Compared with expenditures for each child in a husband-wife, two-child family, husband-wife households with one child spend an average of 24 percent more on the single child, and those with three or more children spend an average of 23 percent less on each child.

Therefore, to adjust the figures in tables 2 through 7 to estimate annual overall expenditures on an only child, 24 percent should be added to the total expense for the child's age category. To estimate expenditures on three or more children, 23 percent should be subtracted from the total expense for each child's age category, and these totals should be summed. As an example of adjustments needed for different numbers of children, the total expenses for a middle-income family in the overall United States on a child age 15-17 with no siblings would be \$10,800 ( $\$8,710 \times 1.24$ ) and the total expenses on three children ages 3-5, 12-14, and 15-17 would be \$19,330 ( $(\$7,810 + \$8,580 + \$8,710) \times .77$ ). For a particular budgetary component, the percentages may be more or less. As family size increases, costs per child for food decrease less than for housing and transportation.

### Expenditures by Single-Parent Families

The estimates of expenditures on children by husband-wife families do not apply to single-parent families, which account for an increasing percentage of families with children. Therefore, separate estimates of child-rearing expenses in single-parent households were made using the CE data. Most single-parent families in the survey (90 percent) were headed by a woman.



The method used in determining child-rearing expenses for two-parent households was followed. Multivariate analysis was used to estimate expenditures for each budgetary component, controlling for income level, household size (a single parent with two children was used as the standard), and age of the younger child (the same age categories as used with children in two-parent families).

Income groups of single-parent households (before-tax income under \$31,000 and \$31,000 and over in 1992 dollars; these income groups were inflated to 1995 dollars in the table) were selected to correspond with the income groups used in estimating child-rearing expenditures in husband-wife households. This income includes child support payments. The two higher income groups of two-parent families (income between \$31,000 and \$52,160 and over \$52,160 in 1992 dollars) were combined because only 17 percent of single-parent households had a before-tax income of \$31,000 and over. The sample was weighted to reflect the U.S. population of interest.

Children's clothing and child care and education expenditures were divided between the two children in the one-parent household. For food and health care, household member shares were calculated for a three-member household (single parent and two children, with the younger child in one of the six age categories) using the USDA food plans and the 1987 NMES findings. These shares for the younger child in a single-parent family were then applied to estimated food and health care expenditures to determine expenses on the younger child in each age category.

Housing, transportation, and miscellaneous expenditures were allocated among household members on a per capita basis. Transportation expenses were adjusted to account for nonemployment-related activities in single-parent families. Income and expenses were updated to 1995 dollars.

Child-rearing expense estimates for single-parent families are in table 8, p. 20. For the lower income group (1995 before-tax income less than \$33,700), a comparison of estimated expenditures on the younger child in a single-parent family with two children with those of the younger child in a husband-wife family with two children is presented in table 1, p. 12; as previously discussed, 83 percent of single-parent families and 33 percent of husband-wife families were in this lower income group. More single-parent than husband-wife families fell in the bottom range of this lower income group. Average income for single-parent families in the lower income group is \$14,100, compared with \$21,000 for husband-wife families in this income group. However, total expenditures on a child through age 17 are, on average, only 5 percent lower in single-parent households than in two-parent households.

Single-parent families in this lower income group, therefore, spend a larger proportion of their income on children. On average, housing expenses are higher, whereas transportation, health care, child care and education, and miscellaneous expenditures on a child are lower in single-parent than in husband-wife households. Child-related food and clothing expenditures are similar, on average, in single-parent and in two-parent families.

**...total expenditures on a child through age 17 are, on average, only 5 percent lower in single-parent households than in two-parent households.**

## Estimating Future Costs

The estimates presented in this study represent household expenditures on a child of a certain age in 1995. To estimate these expenses for the first 17 years, future price changes need to be incorporated in the figures. To do this, a future cost formula is used such that:

$$C_f = C_p(1 + i)^n$$

where:

$C_f$  = projected future annual dollar expenditure on a child of a particular age

$C_p$  = present (1995) annual dollar expenditure on a child of a particular age

$i$  = projected annual inflation (or deflation)

$n$  = number of years from present until child will reach a particular age

An example of estimated future expenditures on the younger child in a husband-wife family with two children for each of the three income groups for the overall United States is presented. The example assumes a child is born in 1995, reaching age 17 in the year 2012, and the average annual inflation rate over this time is 5.4 percent (the average annual inflation rate over the past 20 years) (9). As can be seen, total family expenses on a child through age 17 would be \$176,420, \$238,840, and \$346,980 for households in the lowest, middle-, and highest income groups, respectively. In 1995 dollar values, these figures would be \$106,890, \$145,320, and \$211,830.

Inflation rates other than 5.4 percent could be substituted into the formula if projections of these rates vary in the future. Also, it is somewhat unrealistic to assume that households remain in one income category as a child grows older. For most families, income rises over time. In addition, such projections assume child-rearing expenditures change only with inflation, but parental expenditure patterns also change over time.

**Estimated annual expenditures on a child born in 1995, by income group<sup>1</sup>**

Year	Age	Income group		
		Lowest	Middle	Highest
1995	<1	\$5,490	\$7,610	\$11,320
1996	1	5,790	8,020	11,930
1997	2	6,100	8,450	12,580
1998	3	6,570	9,140	13,510
1999	4	6,920	9,640	14,240
2000	5	7,300	10,160	15,010
2001	6	7,870	10,790	15,770
2002	7	8,290	11,370	16,620
2003	8	8,740	11,990	17,520
2004	9	9,260	12,620	18,350
2005	10	9,760	13,300	19,340
2006	11	10,290	14,020	20,380
2007	12	12,330	16,130	23,060
2008	13	13,000	17,000	24,310
2009	14	13,700	17,920	25,620
2010	15	14,220	19,170	27,620
2011	16	14,990	20,210	29,110
2012	17	15,800	21,300	30,690
<b>Total</b>		<b>\$176,420</b>	<b>\$238,840</b>	<b>\$346,980</b>

<sup>1</sup>Estimates are for the younger child in husband-wife families with two children for the overall United States.

**Table 1. A comparison of estimated 1995 expenditures on a child by lower income single-parent and husband-wife families<sup>1</sup>**

Age of child	Single-parent households	Husband-wife households
0 - 2	\$4,650	\$5,490
3 - 5	5,220	5,610
6 - 8	5,900	5,740
9 - 11	5,510	5,770
12 - 14	5,940	6,560
15 - 17	6,640	6,460
<b>Total (0 - 17)</b>	<b>\$101,580</b>	<b>\$106,890</b>

<sup>1</sup>Estimates are for the younger child in two-child families in the overall United States with 1995 before-tax income less than \$33,700.

For the higher income group of single-parent families (1995 before-tax income of \$33,700 and over), child-rearing expense estimates are about the same as those for two-parent households in the before-tax income group of \$56,700 and over; total expenses for the younger child through age 17 are \$213,240 for single-parent families versus \$211,830 for husband-wife families in 1995 dollars. Child-rearing expenses for the higher income group of single-parent families, therefore, also consume a larger proportion of income than in husband-wife families. It appears that expenditures on children do not differ very much between single-parent and husband-wife households. What differs is household income levels. As single-parent families have one less potential earner, on average, their total household income is lower and child-rearing expenses are a greater percentage of this income.

Estimates only cover out-of-pocket child-rearing expenditures made by the parent with primary care of the child and do not include child-related expenditures

made by the parent without primary care or others, such as grandparents. Such expenditures could not be estimated from the data. Overall expenses by both parents on a child in a single-parent household are likely greater than this study's estimates.

To determine the extent of the difference in expenditures on an older child in single-parent households, the previous procedure was essentially repeated with the focus being on the older child. A family with two children was used as the standard. On average, single-parent households with two children spend 7 percent less on the older than on the younger child (in addition to differences caused by age). This contrasts with husband-wife households that spend about the same amount on the older and younger child.

As with husband-wife households, more or less is spent if a single-parent household has only one child or three or more children. To determine these differences, multivariate analysis was used to

estimate expenditures for each budgetary component controlling for household size and age of the younger child. These expenditures were then assigned to a child using the previous method. Compared with expenditures for the younger child in a single-parent, two-child family, single-parent households with one child spend an average of 35 percent more on the single child, and those with three or more children spend an average of 28 percent less on each child.

### Other Expenditures on Children

Expenditures on a child estimated in this study are composed of direct parental expenses made on a child through age 17 for seven major budgetary components. These direct expenditures exclude costs related to childbirth and prenatal health care. In 1991, these particular health care costs averaged \$4,720 for a normal delivery and \$7,826 for a cesarean delivery (3). These costs may be reduced by health insurance.

One of the largest expenses made on children after age 17 is the cost of a college education. The College Board (2) estimates that in 1995-96, average annual tuition and fees are \$2,760 at 4-year public colleges and \$10,514 at 4-year private colleges; annual room and board is \$3,847 at 4-year public colleges and \$4,535 at 4-year private colleges. For 2-year colleges in 1995-96, average annual tuition and fees are \$1,405 at public colleges and \$6,564 at private colleges; annual room and board is \$3,997 at 2-year private colleges (no estimates are given for 2-year public colleges). Other parental expenses on children after age 17 include those associated with children living at home or, if children do not live at home, gifts and other contributions to them.

The estimates do not include all government expenditures on children. Examples of excluded expenses would be public education, Medicaid, and school meals. The actual expenditures on children (by parents and the government) would be higher than reported in this study, especially for the lowest income group.

Indirect costs involved in child rearing are also not included in the estimates. Although these costs are typically more difficult to measure than direct expenditures, they can be substantial. The time involved in rearing children is considerable. In addition, one or both parents may need to cut back on hours spent in the labor force to care for children, thus reducing current earnings and future career opportunities. The indirect costs of child rearing may very likely exceed the direct costs. For more on these indirect costs, see Bryant et al. (1), Ireland and Ward (4), and Spalter-Roth and Hartmann (7).

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**Table 2. Estimated annual expenditures\* on a child by husband-wife families, overall United States, 1995**

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous <sup>†</sup>
<b>Income: Less than \$33,700 (Average=\$21,000)</b>								
0-2	\$5,490	\$2,100	\$780	\$700	\$370	\$370	\$630	\$540
3-5	5,610	2,080	870	680	360	360	710	550
6-8	5,740	2,010	1,120	790	410	410	420	580
9-11	5,770	1,810	1,340	860	450	450	250	610
12-14	6,560	2,020	1,410	970	760	450	180	770
15-17	6,460	1,630	1,520	1,300	670	480	300	560
Total	\$106,890	\$34,950	\$21,120	\$15,900	\$9,060	\$7,560	\$7,470	\$10,830
<b>Income: \$33,700 to \$56,700 (Average=\$44,800)</b>								
0-2	\$7,610	\$2,840	\$930	\$1,050	\$440	\$490	\$1,030	\$830
3-5	7,810	2,820	1,080	1,020	430	470	1,140	850
6-8	7,870	2,750	1,370	1,130	470	540	730	880
9-11	7,860	2,550	1,620	1,200	520	580	480	910
12-14	8,580	2,760	1,630	1,310	880	590	350	1,060
15-17	8,710	2,370	1,810	1,660	790	620	600	860
Total	\$145,320	\$48,270	\$25,320	\$22,110	\$10,590	\$9,870	\$12,990	\$16,170
<b>Income: More than \$56,700 (Average=\$84,800)</b>								
0-2	\$11,320	\$4,520	\$1,240	\$1,470	\$580	\$560	\$1,550	\$1,400
3-5	11,540	4,490	1,400	1,440	570	540	1,690	1,410
6-8	11,500	4,420	1,690	1,550	620	620	1,160	1,440
9-11	11,430	4,230	1,960	1,620	670	670	810	1,470
12-14	12,270	4,440	2,060	1,730	1,120	670	620	1,630
15-17	12,550	4,050	2,170	2,100	1,010	710	1,090	1,420
Total	\$211,830	\$78,450	\$31,560	\$29,730	\$13,710	\$11,310	\$20,760	\$26,310

\*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1995 dollars using the Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

<sup>†</sup> Miscellaneous expenses include personal care items, entertainment, and reading materials.



**Table 3. Estimated annual expenditures\* on a child by husband-wife families, urban West,<sup>†</sup> 1995**

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous, <sup>‡</sup>
<b>Income: Less than \$33,500 (Average=\$20,900)</b>								
0-2	\$6,080	\$2,520	\$850	\$770	\$360	\$320	\$630	\$630
3-5	6,210	2,510	940	750	350	300	710	650
6-8	6,370	2,470	1,210	850	390	350	420	680
9-11	6,490	2,330	1,450	920	440	380	250	720
12-14	7,210	2,500	1,510	1,030	730	390	180	870
15-17	7,180	2,150	1,640	1,360	650	410	300	670
Total	\$118,620	\$43,440	\$22,800	\$17,040	\$8,760	\$6,450	\$7,470	\$12,660
<b>Income: \$33,500 to \$56,400 (Average=\$44,600)</b>								
0-2	\$8,200	\$3,240	\$1,000	\$1,120	\$430	\$430	\$1,050	\$930
3-5	8,420	3,230	1,150	1,100	420	410	1,160	950
6-8	8,500	3,190	1,460	1,200	460	470	740	980
9-11	8,570	3,050	1,730	1,270	510	510	480	1,020
12-14	9,250	3,220	1,730	1,390	860	520	360	1,170
15-17	9,400	2,870	1,920	1,730	760	540	610	970
Total	\$157,020	\$56,400	\$26,970	\$23,430	\$10,320	\$8,640	\$13,200	\$18,060
<b>Income: More than \$56,400 (Average=\$84,400)</b>								
0-2	\$11,780	\$4,800	\$1,290	\$1,550	\$560	\$510	\$1,590	\$1,480
3-5	12,020	4,780	1,450	1,530	540	490	1,730	1,500
6-8	12,000	4,750	1,750	1,630	600	550	1,190	1,530
9-11	11,980	4,610	2,040	1,690	650	590	830	1,570
12-14	12,770	4,780	2,140	1,810	1,080	600	640	1,720
15-17	13,100	4,430	2,250	2,170	980	630	1,120	1,520
Total	\$220,950	\$84,450	\$32,760	\$31,140	\$13,230	\$10,110	\$21,300	\$27,960

\*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1995 dollars using the regional Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

<sup>†</sup>The Western region consists of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

<sup>‡</sup>Miscellaneous expenses include personal care items, entertainment, and reading materials.

**Table 4. Estimated annual expenditures\* on a child by husband-wife families, urban Northeast,<sup>†</sup> 1995**

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous <sup>‡</sup>
<b>Income: Less than \$33,500 (Average=\$20,900)</b>								
0-2	\$5,750	\$2,520	\$880	\$580	\$380	\$360	\$510	\$520
3-5	5,870	2,500	980	560	370	340	580	540
6-8	6,090	2,470	1,250	660	420	390	330	570
9-11	6,230	2,330	1,490	730	470	420	190	600
12-14	7,030	2,500	1,560	850	790	430	140	760
15-17	6,930	2,150	1,680	1,170	700	450	220	560
Total	\$113,700	\$43,410	\$23,520	\$13,650	\$9,390	\$7,170	\$5,910	\$10,650
<b>Income: \$33,500 to \$56,300 (Average=\$44,500)</b>								
0-2	\$7,830	\$3,240	\$1,030	\$940	\$450	\$480	\$870	\$820
3-5	8,030	3,220	1,180	920	440	460	970	840
6-8	8,190	3,190	1,500	1,020	490	520	600	870
9-11	8,290	3,050	1,770	1,090	540	560	380	900
12-14	9,020	3,220	1,770	1,200	920	570	280	1,060
15-17	9,130	2,870	1,970	1,540	820	590	480	860
Total	\$151,470	\$56,370	\$27,660	\$20,130	\$10,980	\$9,540	\$10,740	\$16,050
<b>Income: More than \$56,300 (Average=\$84,300)</b>								
0-2	\$11,340	\$4,790	\$1,320	\$1,360	\$590	\$560	\$1,350	\$1,370
3-5	11,590	4,780	1,490	1,340	570	540	1,480	1,390
6-8	11,620	4,740	1,790	1,440	630	610	990	1,420
9-11	11,660	4,600	2,090	1,510	680	650	680	1,450
12-14	12,520	4,770	2,180	1,630	1,150	660	520	1,610
15-17	12,740	4,420	2,300	1,980	1,040	690	900	1,410
Total	\$214,410	\$84,300	\$33,510	\$27,780	\$13,980	\$11,130	\$17,760	\$25,950

\*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1995 dollars using the regional Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

<sup>†</sup>The Northeast region consists of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

<sup>‡</sup>Miscellaneous expenses include personal care items, entertainment, and reading materials.

**Table 5. Estimated annual expenditures\* on a child by husband-wife families, urban South,<sup>†</sup> 1995**

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous <sup>‡</sup>
<b>Income: Less than \$33,800 (Average=\$21,100)</b>								
0-2	\$5,550	\$2,070	\$750	\$700	\$400	\$420	\$700	\$510
3-5	5,670	2,050	840	680	390	400	780	530
6-8	5,810	2,010	1,090	780	440	460	470	560
9-11	5,910	1,870	1,320	850	490	490	290	600
12-14	6,670	2,050	1,380	970	810	500	210	750
15-17	6,630	1,690	1,500	1,300	710	530	350	550
Total	\$108,720	\$35,220	\$20,640	\$15,840	\$9,720	\$8,400	\$8,400	\$10,500
<b>Income: \$33,800 to \$56,900 (Average=\$45,000)</b>								
0-2	\$7,730	\$2,790	\$910	\$1,060	\$470	\$550	\$1,140	\$810
3-5	7,940	2,780	1,050	1,040	460	530	1,250	830
6-8	8,010	2,740	1,340	1,140	510	600	820	860
9-11	8,050	2,600	1,590	1,210	570	640	540	900
12-14	8,740	2,770	1,600	1,330	940	650	400	1,050
15-17	8,950	2,420	1,790	1,670	840	680	700	850
Total	\$148,260	\$48,300	\$24,840	\$22,350	\$11,370	\$10,950	\$14,550	\$15,900
<b>Income: More than \$56,900 (Average=\$85,200)</b>								
0-2	\$11,370	\$4,370	\$1,190	\$1,480	\$620	\$640	\$1,700	\$1,370
3-5	11,600	4,350	1,360	1,460	600	610	1,840	1,380
6-8	11,580	4,320	1,640	1,570	660	690	1,290	1,410
9-11	11,530	4,170	1,920	1,630	720	740	900	1,450
12-14	12,350	4,350	2,010	1,750	1,180	750	710	1,600
15-17	12,710	3,990	2,120	2,110	1,070	770	1,250	1,400
Total	\$213,420	\$76,650	\$30,720	\$30,000	\$14,550	\$12,600	\$23,070	\$25,830

\*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1995 dollars using the regional Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

<sup>†</sup>The Southern region consists of Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

<sup>‡</sup>Miscellaneous expenses include personal care items, entertainment, and reading materials.

**Table 6. Estimated annual expenditures\* on a child by husband-wife families, urban Midwest,<sup>†</sup> 1995**

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous <sup>‡</sup>
<b>Income: Less than \$33,800 (Average=\$21,100)</b>								
0-2	\$4,970	\$1,860	\$710	\$610	\$350	\$340	\$610	\$490
3-5	5,100	1,840	800	590	340	330	690	510
6-8	5,250	1,810	1,040	700	380	370	410	540
9-11	5,340	1,670	1,260	760	430	410	240	570
12-14	6,070	1,840	1,320	880	720	410	170	730
15-17	6,000	1,480	1,440	1,210	630	430	290	520
Total	\$98,190	\$31,500	\$19,710	\$14,250	\$8,550	\$6,870	\$7,230	\$10,080
<b>Income: \$33,800 to \$56,900 (Average=\$45,000)</b>								
0-2	\$7,110	\$2,590	\$870	\$970	\$410	\$460	\$1,020	\$790
3-5	7,310	2,570	1,010	950	400	440	1,130	810
6-8	7,390	2,530	1,290	1,060	450	500	720	840
9-11	7,430	2,390	1,540	1,120	500	540	470	870
12-14	8,120	2,560	1,550	1,240	840	550	350	1,030
15-17	8,250	2,210	1,730	1,580	750	570	590	820
Total	\$136,830	\$44,550	\$23,970	\$20,760	\$10,050	\$9,180	\$12,840	\$15,480
<b>Income: More than \$56,900 (Average=\$85,100)</b>								
0-2	\$10,670	\$4,150	\$1,160	\$1,400	\$540	\$540	\$1,540	\$1,340
3-5	10,920	4,140	1,310	1,380	530	520	1,680	1,360
6-8	10,890	4,100	1,590	1,480	580	590	1,160	1,390
9-11	10,880	3,960	1,870	1,550	640	630	800	1,430
12-14	11,650	4,130	1,950	1,670	1,060	640	620	1,580
15-17	11,980	3,780	2,070	2,030	960	670	1,090	1,380
Total	\$200,970	\$72,780	\$29,850	\$28,530	\$12,930	\$10,770	\$20,670	\$25,440

\*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1995 dollars using the regional Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

<sup>†</sup>The Midwest region consists of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

<sup>‡</sup>Miscellaneous expenses include personal care items, entertainment, and reading materials.

**Table 7. Estimated annual expenditures\* on a child by husband-wife families, Rural areas,<sup>†</sup> 1995**

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous <sup>‡</sup>
<b>Income: Less than \$34,000 (Average=\$21,200)</b>								
0-2	\$5,020	\$1,570	\$720	\$810	\$370	\$420	\$620	\$510
3-5	5,130	1,550	810	790	360	400	700	520
6-8	5,270	1,520	1,050	890	400	450	410	550
9-11	5,380	1,370	1,270	960	450	490	250	590
12-14	6,140	1,550	1,330	1,080	760	500	180	740
15-17	6,070	1,190	1,450	1,410	670	520	290	540
Total	\$99,030	\$26,250	\$19,890	\$17,820	\$9,030	\$8,340	\$7,350	\$10,350
<b>Income: \$34,000 to \$57,200 (Average=\$45,300)</b>								
0-2	\$7,170	\$2,310	\$880	\$1,170	\$440	\$540	\$1,030	\$800
3-5	7,360	2,290	1,020	1,150	420	520	1,140	820
6-8	7,440	2,250	1,300	1,250	470	590	730	850
9-11	7,480	2,110	1,550	1,320	520	630	470	880
12-14	8,200	2,290	1,550	1,440	890	650	350	1,030
15-17	8,350	1,920	1,740	1,790	790	670	600	840
Total	\$138,000	\$39,510	\$24,120	\$24,360	\$10,590	\$10,800	\$12,960	\$15,660
<b>Income: More than \$57,200 (Average=\$85,700)</b>								
0-2	\$10,760	\$3,900	\$1,160	\$1,600	\$570	\$630	\$1,560	\$1,340
3-5	11,000	3,880	1,320	1,580	560	610	1,690	1,360
6-8	10,990	3,850	1,600	1,680	610	690	1,170	1,390
9-11	10,960	3,700	1,870	1,750	670	730	810	1,430
12-14	11,780	3,880	1,960	1,870	1,120	740	630	1,580
15-17	12,090	3,520	2,070	2,240	1,010	770	1,100	1,380
Total	\$202,740	\$68,190	\$29,940	\$32,160	\$13,620	\$12,510	\$20,880	\$25,440

\*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1995 dollars using the regional Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

<sup>†</sup>Rural areas are places of fewer than 2,500 people outside a Metropolitan Statistical Area.

<sup>‡</sup>Miscellaneous expenses include personal care items, entertainment, and reading materials.



**Table 8. Estimated annual expenditures\* on a child by single-parent families, overall United States, 1995**

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous <sup>†</sup>
<b>Income: Less than \$33,700 (Average=\$14,100)</b>								
0-2	\$4,650	\$1,890	\$860	\$660	\$340	\$180	\$390	\$330
3-5	5,220	2,140	910	580	360	270	530	430
6-8	5,900	2,280	1,150	670	420	310	490	580
9-11	5,510	2,190	1,330	480	420	400	230	460
12-14	5,940	2,190	1,330	550	720	420	290	440
15-17	6,640	2,320	1,450	870	840	420	220	520
Total	\$101,580	\$39,030	\$21,090	\$11,430	\$9,300	\$6,000	\$6,450	\$8,280
<b>Income: \$33,700 or more (Average=\$51,100)</b>								
0-2	\$10,590	\$4,060	\$1,330	\$2,000	\$480	\$410	\$960	\$1,350
3-5	11,360	4,320	1,410	1,920	500	550	1,210	1,450
6-8	12,110	4,450	1,690	2,020	580	640	1,130	1,600
9-11	11,710	4,360	2,040	1,830	580	760	660	1,480
12-14	12,440	4,370	2,000	1,900	960	810	940	1,460
15-17	12,870	4,500	2,110	2,060	1,100	800	760	1,540
Total	\$213,240	\$78,180	\$31,740	\$35,190	\$12,600	\$11,910	\$16,980	\$26,640

\*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1995 dollars using the Consumer Price Index. The figures represent estimated expenses on the younger child in a single-parent, two-child family. For estimated expenses on the older child, multiply the total expense for the appropriate age category by 0.93. To estimate expenses for two children, the expenses on the younger child and older child—after adjusting the expense on the older child downward—should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.35. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.72—after adjusting the expenses on the older children downward. For expenses on all children in a family, these totals should be summed.

<sup>†</sup>Miscellaneous expenses include personal care items, entertainment, and reading materials.

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# Assessment of Energy Intakes in the U.S. Population, 1989-91

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The 1989-91 Continuing Survey of Food Intakes by Individuals was used to assess food energy intakes of subgroups within the U.S. population. For adolescents and adults, especially females, the average reported energy intakes were well below the Recommended Energy Allowances (REA) established by the National Research Council—not consistent with the increase in the proportion of individuals found to be overweight. Energy intakes as a percent of the REA ranged from 97 percent for children ages 1-3 to 73 percent for females ages 25-50. A ratio of reported energy intakes (EI) to an estimate of resting energy expenditure (REE) based on self-reported body weight, gender, and age was calculated to assess potential energy underreporting. Males ages 51 and over and females ages 25-50 and 51 and over had EI/REE ratios below 1.2, indicating energy underreporting (1). Lower EI/REE ratios were characteristic of individuals in higher weight-status categories. Very sedentary lifestyles may partly explain the low EI/REE ratios. National studies of daily activity levels would be critical to understanding the importance of inactivity versus underreporting. Future studies of food intake surveys should incorporate some assessment of energy reporting.

**N**ational surveys of dietary intakes provide estimates of food and nutrient intakes that help direct policy decisions related to food assistance programs, nutrition education efforts, food safety, and diet/health relationships. Accurate assessment of energy intake is important for several reasons. First, the number of servings recommended for the Pyramid food groups is based on the level of kilocalories needed (22). For example, a minimum of 6 bread group servings is recommended at the 1,600-kilocalorie level, whereas 11 bread

group servings are recommended at the 2,800-kilocalorie level (22). Second, energy intake is one of several factors (diet, genetics, level of activity) associated with the development of obesity, a major public health problem that is increasing dramatically in the United States (12, 20). Finally, the intake of energy is associated with the intake of foods and food components. If estimates of food energy are biased, estimates of other dietary parameters may also be affected.

Measuring dietary intakes of individuals living in the community (rather than in institutions), however, is an inherently difficult process. Direct measures, such as collection of duplicate portions, are intrusive and affect behavior (13). Indirect measures depend on the self-reporting skills of individuals who must remember or record all foods eaten in a day along with an estimate of the quantity consumed. The descriptions given by the individual must then be assigned food codes that most closely match the description. Representative nutrient composition values are then calculated for the foods.

Until recently, dietary methods were often validated by comparing results from one method with those from another method believed to be more accurate. One study employing unobtrusive observation and weighing of foods eaten found small intakes overreported and large intakes underreported by 24-hour recalls (6). The development of the doubly-labeled water technique<sup>1</sup> has provided an objective, external test of the validity of dietary assessments of food energy. The doubly-labeled water technique and supervised feeding of diets have shown that self-reported dietary intakes underestimate energy intake by as much as 20 to 25 percent or more, especially among obese respondents (2, 5, 11, 13, 14, 17). However, these techniques assess only energy intake, not the intake of foods or nutrients.

If the cause of energy underreporting is primarily in estimating the quantity of food portions eaten, the estimates for many food components may be underestimated. If omitted foods such as soft drinks or candy are the primary cause of underreporting, the estimates for food components such as fat and food energy might be low, but estimates for vitamins, minerals, and major food groups might be reasonable. Further complicating the impact of low energy reporting on estimates of nutrients and other food components is the possibility that certain nutrient-dense foods might be overreported.

This paper examines the level of energy reporting in a national survey in relation to recommended levels of consumption for population subgroups.

## Methodology

The sample is composed of individuals ages 1 and over surveyed in USDA's 1989-91 Continuing Survey of Food Intakes by Individuals (CSFII) (19). Along with household and individual characteristics, each individual was targeted to have one 24-hour recall and a 2-day dietary record to assess dietary intake. This study includes individuals with a complete 24-hour recall who were not bedridden, did not indicate they were on a weight loss diet, and for females, were not pregnant or lactating. The 24-hour recall was chosen for this study because the primary interest was in evaluating mean intakes, and the 2-day dietary record is no longer in use by USDA. In addition, the sample size for the 24-hour recall was larger than that for all 3 days.

Independent samples of all-income households and low-income households (households at or below 130 percent of the poverty level) were combined during the weighting process. The survey design for both samples was a multi-stage national probability sample of households in the 48 conterminous States and Washington, DC. For each household sampled, all individuals were eligible for the survey. The overall response rate for individuals completing the 24-hour recall was 57.6 percent. Response rate is important in evaluating survey results because those not participating may have different characteristics and behavioral patterns from those who do participate. The application of weighting factors helps reduce but does not eliminate the potential for bias.

Weighting factors were applied to: Adjust for non-response; adjust for oversampling of low-income households; match population characteristics; and to equalize interviews over the 12 months of the year and the 7 days of the week. The average design effect<sup>2</sup> was about 2.3, reflecting the complex sampling design and the weighting procedures (19). Mean intakes based on a cell size of 69 (30 times the average design effect) or less may be less statistically reliable than other estimates (19). The significance level for the regression analysis was set at 0.01 rather than 0.05 because of the complex survey design.

<sup>2</sup>The design effect is a measure of how much the variance of estimates is increased compared with a simple random sample.

<sup>1</sup>In the doubly-labeled water method, subjects consume water that has both the hydrogen and oxygen molecules labeled as stable isotopes. Monitoring the elimination rate of labeled hydrogen in water and the elimination rate of labeled oxygen in water and carbon dioxide permits the calculation of energy expenditure.

For each individual, the energy in kilocalories per day required to maintain basic bodily functions when at rest (the Resting Energy Expenditure or REE) was calculated using formulas based on body weight in kilograms, gender, and age (15). Body weights and heights from the survey are self-reported and may be more or less than actual heights and weights (4, 16). Overweight individuals tend to under-report their weights, while underweight individuals tend to overreport (16):

Because more individuals are overweight than underweight, a population REE from self-reported weights will tend to be lower than that using actual weights.

The total food energy in kilocalories (Energy Intake or EI) estimated by the 24-hour recall was divided by the estimated REE to yield an EI/REE ratio. The EI/REE ratio for a given age/sex group reflects differences in self-reported body weight and is indicative of the general activity level. For example, a ratio in the 1.5-1.6 range represents a light activity level, whereas a ratio of 1.3 is a minimum value that may not be compatible with cardiovascular fitness (15). Bingham has suggested that the ratio should be on the order of 1.5 for sedentary populations and that a population ratio of 1.2 or under is evidence of gross underreporting (1). The suggested levels of EI/REE ratios are based on what is known about variability in energy intakes, REE, and levels of physical activity. These ratio levels might need to be adjusted as additional research results become available.

**Table 1. Measures of energy intake: Mean intakes per individual in a day, by age and gender, 1 day, CSFII 1989-91**

Population group	n	kcal	% REA	EI/REE	EI/REE as % standard <sup>1</sup>
<b>Children</b>					
1 - 3 years	757	1,262	97	1.61	91
4 - 6 years	719	1,559	87	1.63	86
7 - 10 years	912	1,875	94	1.56	88
<b>Males</b>					
11 - 14 years	466	2,252	90	1.49	88
15 - 18 years	332	2,591	86	1.40	84
19 - 24 years	473	2,559	88	1.40	84
25 - 50 years	2,159	2,324	80	1.25	78
51 years and over	1,510	1,947	85	1.19	78
<b>Females</b>					
11 - 14 years	396	1,891	86	1.43	85
15 - 18 years	381	1,700	77	1.17	73
19 - 24 years	584	1,700	77	1.24	78
25 - 50 years	2,714	1,611	73	1.15	74
51 years and over	2,320	1,467	77	1.12	74

<sup>1</sup>EI/REE as % standard was calculated by dividing the EI/REE ratios found in this study by the EI/REE ratios used by the NRC to establish the REAs and multiplying by 100.

## Results

Mean daily intakes of energy are presented in several different forms by age and gender in table 1, with the same population groups used by the National Research Council (NRC) to establish the Recommended Energy Allowance (REA) (15). Reported energy intake in kilocalories peaked during the 15-18 age group for males and the 11-14 age group for females and then declined with age.

Almost all groups of children and females had average intakes at approximately the 1,600-kilocalorie level associated with the minimum number of food group servings identified in the Food Guide Pyramid. The exceptions were children 7-10 years old and females 11-14 years old who had intakes between the 1,600 and 2,200 levels. Among males, the 11-14 and the 25-50 age groups had reported energy intakes close to the 2,200-kilocalorie level at the midrange of the Pyramid, whereas the 15-18 and the 19-24 age groups had intakes between the midrange of 2,200 and



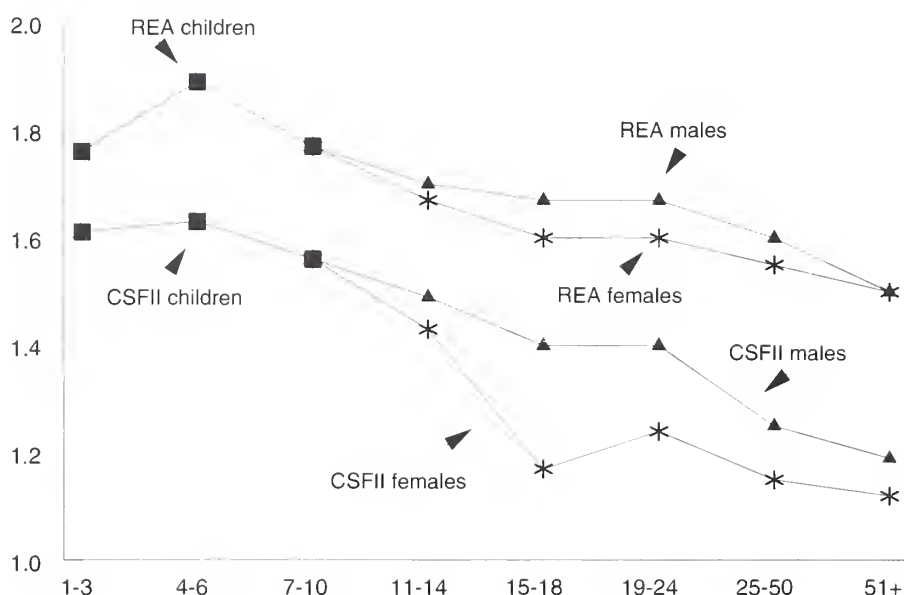
the maximum of 2,800. The 51 and over age group of males averaged about 2,000 kilocalories.

Reported energy intakes as a percent of the REA ranged from a high of 97 percent for children 1-3 years old to a low of 73 percent for females 25-50 years old. For all age groups examined, males reported a higher proportion of their REA than did females.

The EI/REE ratio was highest for children and lowest for females. Children and males 11-14 years old had ratios in the 1.5-1.6 range characteristic of sedentary populations. Males 15-18 and 19-24 years old and females 11-14 years old had ratios of about 1.4, still above the 1.3 minimum level cited in the NRC report (15). Males 25-50 years old and females 19-24 years old had ratios below the NRC minimum but still above the 1.2 minimum of Bingham. Males 51 years and over and females 15-18, 25-50, and 51 years and over had EI/REE ratios below the 1.2 level cited by Bingham as evidence of underreporting (1).

The EI/REE ratios found in the CSFII were compared with the EI/REE ratios used by the NRC to establish the REA's (see figure). The pattern of change relative to age and gender found in the survey was similar to the NRC pattern. However, the survey level appears lower and the difference between males and females appears greater. Between females age 11-14 and 15-18, there was a much sharper drop in the ratio in the survey compared with the NRC.

## EI/REE ratio used in establishing Recommended Energy Allowances (REA) and as estimated by CSFII 1989-91 reported weights and intakes



Converting the EI/REE ratio to a percent of the ratio used by the NAS to establish the REA's yields percentages generally the same as the percentage of the REA. The EI/REE percentage is consistently lower than the REA percentage for children and males, with no clear pattern for females. Differences in the two measures may reflect differences in weight and activity patterns assumed for the REA's compared with the reported weights and/or kilocalorie levels in the survey.

Measures of energy intake by weight status are presented for children in table 2. The three Body Mass Index<sup>3</sup> (BMI)

categories are based on the BMI levels discussed in the report of the Dietary Guidelines Advisory Committee (21). As health indicators, the categories may not be valid for children, but they do provide a mechanism for energy intake comparisons. For age groups 1-3 and 4-6, there was no clear pattern of energy intake and weight status. Children 7-10 years old tended to exhibit lower EI/REE ratios and percentages with higher weight classes. Energy in kilocalories and percent REA showed no clear pattern. Children 7-10 years old in the highest weight category had an EI/REE ratio at the level (1.3) associated with minimal activity.

<sup>3</sup>Body Mass Index is calculated by dividing weight in kilograms by the square of height in meters.



**Table 2. Measures of energy intake of children: Mean intakes per individual in a day, by age and weight status,<sup>1</sup> 1 day, CSFII 1989-91**

Age/Estimated BMI category	n	kcal	% REA	EI/REE	EI/REE as % standard <sup>2</sup>
<b>Age 1 - 3</b>					
BMI <19	404	1,280	98	1.63	92
BMI 19 - 25	196	1,299	100	1.61	92
BMI >25	157	1,171	90	1.56	89
<b>Age 4 - 6</b>					
BMI <19	472	1,544	86	1.63	86
BMI 19 - 25	165	1,620	90	1.64	87
BMI >25	82	1,530	85	1.53	81
<b>Age 7 - 10</b>					
BMI <19	568	1,861	93	1.63	92
BMI 19 - 25	254	1,928	96	1.47	83
BMI >25	90	1,809	90	1.32	74

<sup>1</sup>Weight status is derived from self-reported heights and weights.

<sup>2</sup>EI/REE as % standard was calculated by dividing the EI/REE ratios found in this study by the EI/REE ratios used by the NRC to establish the REAs and multiplying by 100.

**National studies of daily activity levels would be critical to understanding the importance of inactivity versus underreporting.**

Among males (table 3, p. 26), there were limitations in sample size for the under 19 BMI category. However, for all age groups the over 25 BMI group had lower EI/REE ratios and lower EI/REE percentages than the 19-25 BMI group. As with children, kilocalories and percent REA showed no clear pattern relative to weight status for males. For all age groups, males in the over 25 BMI group had EI/REE ratios close to or below the 1.2 level indicative of underreporting.

Among females (table 4, p. 27), EI/REE ratios in the over 25 BMI category were very low, at or below 1.0. EI/REE ratios in the under 19 BMI category were consistently at or above the 1.3 level. Females in the 19-25 BMI category generally had ratios around 1.2, except

those ages 11-14 who averaged about 1.4 and those ages 19-24 who averaged about 1.3.

Adults in the top two BMI categories were subdivided into income levels (the number of subjects in the lowest BMI category was too small for further subdivision) (table 5, p. 28). At each of the three income levels, both males and females in the two age groups examined had a similar pattern of lower EI/REE ratios at higher BMI levels. For males and females ages 25-50, the EI/REE ratios were similar across the income levels; however, for older males and females, those with income at less than 131 percent of the poverty level appeared to have slightly lower ratios in each weight class.

The relationship between the sufficiency of household food supplies (self-described) and the EI/REE ratio is presented in table 6, p. 28 by weight category for males and females ages 25 and over. Households could choose among four levels of food sufficiency: "Enough of the kinds of food we want to eat"; "enough but not always what we want to eat"; "sometimes not enough to eat"; or "often not enough to eat." Because of sample size limitations, the age groups were combined, as well as households that indicated either sometimes or often not enough to eat. Both males and females in households that sometimes or often did not have enough to eat appeared to have lower EI/REE ratios for both weight categories.

For each age group of children, males, and females, regression analysis (18) was performed to test for statistical significance between the EI/REE ratio and weight status, income level, and sufficiency of household food supplies. Weight status was tested by using BMI as a continuous variable, whereas income and food sufficiency were tested as categorical variables.

The overall equations were significant at the 0.01 level of probability for all the age subgroups examined. As shown in table 7, p. 29, the percent of variation explained ( $R^2$ ) ranged from less than 2 percent to around 9 percent. BMI was significant at the 0.01 level for each age group. Living in a household below 131 percent of the poverty level was significant only for males ages 15-18 and 51 and over and for females ages 51 and over. Living in households that sometimes or often did not have enough to eat was significant for males ages 11-14, 25-50, and 51 and over; and for females ages 25-50 and 51 and over.

**Table 3. Measures of energy intake of males: Mean intakes per individual in a day, by age and weight status,<sup>1</sup> 1 day, CSFII 1989-91**

Age/Estimated BMI category	n	kcal	% REA	EI/REE	EI/REE as % standard <sup>2</sup>
<b>Age 11 - 14</b>					
BMI <19	205	2,203	88	1.64	96
BMI 19 - 25	201	2,258	90	1.42	84
BMI >25	60 <sup>3</sup>	2,398	96	1.25	74
<b>Age 15 - 18</b>					
BMI <19	45 <sup>3</sup>	2,221	74	1.38	83
BMI 19 - 25	227	2,704	90	1.48	88
BMI >25	60 <sup>3</sup>	2,368	79	1.09	65
<b>Age 19 - 24</b>					
BMI <19	28 <sup>3</sup>	1,850	64	1.21	72
BMI 19 - 25	289	2,632	91	1.49	89
BMI >25	156	2,511	87	1.24	74
<b>Age 25 - 50</b>					
BMI <19	40 <sup>3</sup>	2,334	80	1.47	92
BMI 19 - 25	906	2,355	81	1.35	84
BMI >25	1,213	2,302	79	1.17	73
<b>Age 51 and over</b>					
BMI <19	31 <sup>3</sup>	1,625	71	1.29	86
BMI 19 - 25	602	1,915	83	1.26	84
BMI >25	877	1,978	86	1.12	75

<sup>1</sup>Weight status is derived from self-reported heights and weights.

<sup>2</sup>EI/REE as % standard was calculated by dividing the EI/REE ratios found in this study by the EI/REE ratios used by the NRC to establish the REAs and multiplying by 100.

<sup>3</sup>Due to the small number of subjects, estimates may be less statistically reliable than other estimates.

**Table 4. Measures of energy intake of females: Mean intakes per individual in a day, by age and weight status,<sup>1</sup> 1 day, CSFII 1989-91**

Age/Estimated BMI category	n	kcal	% REA	EI/REE	EI/REE as % standard <sup>2</sup>
<b>Age 11 - 14</b>					
BMI <19	177	1,838	84	1.49	89
BMI 19 - 25	175	1,967	89	1.43	86
BMI >25	44 <sup>3</sup>	1,735	79	1.14	68
<b>Age 15 - 18</b>					
BMI <19	69 <sup>3</sup>	1,765	80	1.32	82
BMI 19 - 25	245	1,721	78	1.19	75
BMI >25	67 <sup>3</sup>	1,531	70	0.89	56
<b>Age 19 - 24</b>					
BMI <19	73	1,806	82	1.49	92
BMI 19 - 25	377	1,717	78	1.27	80
BMI >25	134	1,569	71	0.96	60
<b>Age 25 - 50</b>					
BMI <19	181	1,712	78	1.38	89
BMI 19 - 25	1,402	1,616	73	1.20	78
BMI >25	1,131	1,582	72	1.03	66
<b>Age 51 and over</b>					
BMI <19	163	1,459	77	1.31	87
BMI 19 - 25	1,029	1,498	79	1.19	80
BMI >25	1,128	1,434	75	1.01	67

<sup>1</sup>Weight status is derived from self-reported heights and weights.

<sup>2</sup>EI/REE as % standard was calculated by dividing the EI/REE ratios found in this study by the EI/REE ratios used by the NRC to establish the REAs and multiplying by 100.

<sup>3</sup>Due to the small number of subjects, estimates may be less statistically reliable than other estimates.

The level of  $R^2$  was lowest (under 2 percent) for children ages 1-3 and 4-6. This may reflect less accurate reporting of heights and weights for children, resulting in more errors in estimated BMI and weight status classification (4).

The statistically significant regression coefficients in table 7 are all negatively related to the EI/REE ratio. For example, for males ages 51 and over, a one-unit increase in BMI is associated with a decrease in the EI/REE ratio of 0.021, controlling for income status and household food sufficiency.

## Discussion

The Recommended Energy Allowance (REA) is set to reflect the average need of a population subgroup, unlike the Recommended Dietary Allowances (RDA) that are set high enough above the estimated mean requirement to meet the needs of practically all healthy individuals (15). For older children and adults, especially females, the reported energy intakes in this study were, on average, well below the REA. Energy intakes consistently below requirements, over time, will lead to a loss in weight. This is not consistent with recent studies of weight status in the U.S. population (12, 20). For both children and adults, the percentage of individuals classified as overweight increased during the period from 1976-80 to 1989-91. Either the REA is set too high or reports of energy intake are too low.

The EI/REE ratios were consistently below the levels used by NRC to establish the REA's. For females and higher weight individuals in particular, the ratios were well below the recommended levels and often below the minimum level identified by NRC. Adult males and females starting in the teen years had ratios low enough to suggest major underreporting—especially in the higher weight groups. The lower ratios within weight groups for adults in households with restricted food supplies may indicate lower actual intakes in addition to underreporting.

A summary of studies using the doubly-labeled water technique supports the EI/REE ratios used by NRC. The mean ratio was 1.67 and the mean minus two standard deviations was 1.28 for the 105 adult males and females studied (7). Males averaged 1.78 while females averaged 1.62. Whether the activity levels found in these small studies is representative of the population remains a question.

Table 8, p. 30, presents EI/REE ratios for adult men and women using the same age breaks and overweight definitions used in the NHANES III survey (3). For all age groups of overweight females (using a BMI of 27.3 or above as the criterion), both surveys found EI/REE ratios considerably below the 1.2 level indicating substantial underreporting. In CSFII, overweight males (using a BMI of 27.8 or above as the criterion) had average ratios below 1.2 for all age groups, whereas the NHANES III found only overweight males ages 60 or over

**Table 5. The mean EI/REE ratio for adult males and females by age, weight status,<sup>1</sup> and income level, CSFII 1989-91**

Age/Estimated BMI category	Household income as a percent of poverty level		
	<131	131 - 350	>350
<b>Males age 25 - 50</b>			
BMI 19 - 25	1.33 (n = 291)	1.36 (n = 336)	1.34 (n = 279)
BMI >25	1.14 (n = 363)	1.16 (n = 475)	1.18 (n = 375)
<b>Males age 51 and over</b>			
BMI 19 - 25	1.16 (n = 226)	1.30 (n = 220)	1.25 (n = 156)
BMI >25	1.02 (n = 273)	1.14 (n = 322)	1.14 (n = 282)
<b>Females age 25 - 50</b>			
BMI 19 - 25	1.18 (n = 470)	1.19 (n = 509)	1.21 (n = 423)
BMI >25	0.97 (n = 530)	1.06 (n = 390)	1.01 (n = 211)
<b>Females age 51 and over</b>			
BMI 19 - 25	1.13 (n = 434)	1.21 (n = 346)	1.21 (n = 249)
BMI >25	0.92 (n = 557)	1.03 (n = 388)	1.05 (n = 183)

<sup>1</sup>Weight status is derived from self-reported heights and weights.

**Table 6. The mean EI/REE ratio for adult males and females by weight status<sup>1</sup> and household food sufficiency, CSFII 1989-91**

Age/Estimated BMI category	Household food sufficiency		
	Enough of the kinds of foods wanted	Enough but not always kinds of food wanted	Sometimes or often not enough to eat
<b>Males age 25 and over</b>			
BMI 19 - 25	1.31 (n = 1,070)	1.40 (n = 362)	1.19 (n = 72)
BMI >25	1.15 (n = 1,508)	1.17 (n = 507)	0.80 (n = 73)
<b>Females age 25 and over</b>			
BMI 19 - 25	1.21 (n = 1,765)	1.17 (n = 566)	0.97 (n = 96)
BMI >25	1.03 (n = 1,508)	0.98 (n = 633)	0.90 (n = 114)

<sup>1</sup>Weight status is derived from self-reported heights and weights.

**Table 7. The relationship between the mean EI/REE ratio and BMI, income status, and household food sufficiency, CSFII 1989-91**

Age/sex	Explanation of EI/REE variation (R <sup>2</sup> )	BMI	Household income <131% poverty level	Sometimes or often not enough to eat
	<i>Percent</i>		<i>Beta coefficient</i>	
<b>Children</b>				
1 - 3 years	1.5	-0.009*	+0.000	-0.101
4 - 6 years	1.6	-0.010*	-0.043	-0.117
7 - 10 years	6.0	-0.024*	-0.040	-0.143
<b>Males</b>				
11 - 14 years	8.4	-0.037*	-0.112	-0.267*
15 - 18 years	5.3	-0.036*	-0.247*	+0.444
19 - 24 years	5.5	-0.037*	-0.089	-0.254
25 - 50 years	3.8	-0.024*	+0.015	-0.155*
51 years and over	4.4	-0.021*	-0.092*	-0.187*
<b>Females</b>				
11 - 14 years	3.9	-0.023*	+0.030	-0.106
15 - 18 years	5.4	-0.026*	-0.043	-0.130
19 - 24 years	9.1	-0.036*	+0.074	-0.165
25 - 50 years	4.0	-0.017*	-0.001	-0.132*
51 years and over	8.7	-0.023*	-0.086*	-0.168*

\* p ≤ 0.01.

**...users of food intake survey data should assess energy reporting as a component of their analysis.**

were below this level. For adults ages 20 and over, the CSFII values were about 85 percent of the NHANES III values for males and about 90 percent for females. Differences in 24-hour recall protocols between the two surveys have been identified (3). Another major difference is the use of self-reported heights and weights in CSFII compared with the measured heights and weights in the NHANES III survey. Overweight individuals, especially overweight females, have been found to under-report their weights (16).

### **Implications for Further Research**

Additional research is needed to understand energy reporting. A critical component is the activity level of population subgroups from nationally representative samples. Assessments of general activity levels need to be integrated into surveys of food energy intakes. Since body weight is another key component in estimating energy needs, a study should be done to assess the impact of using self-reported weights on estimating the REE and the EI/REE ratio.



**Table 8. Mean EI/REE ratio by selected age groups for adult males and females by weight status,<sup>1</sup> CSFII 1989-91**

Age	Males		Females		Overweight males*		Overweight females*	
	n	EI/REE	n	EI/REE	n	EI/REE	n	EI/REE
20 - 29 years	884	1.35	1,037	1.21	172	1.00	204	0.98
30 - 59 years	2,117	1.22	2,745	1.13	660	1.13	867	1.01
Over 60 years	1,064	1.20	1,734	1.14	264	1.10	545	0.95
Total over 20 years	4,065	1.24	5,516	1.15	1,096	1.10	1,616	0.99

<sup>1</sup>Weight status is derived from self-reported heights and weights.

\* Overweight individuals were defined as BMI  $\geq 27.8$  for males and  $\geq 27.3$  for females.

Methods to improve memory recall of foods and quantities eaten need to be explored. After cognitive testing and a pilot study, the procedures used to collect 24-hour recalls in CSFII 1989-91 have been modified to incorporate a multiple-pass approach for CSFII 1994-96 (8). Portion size estimation and the validity of standardized recipes are especially critical for frequently eaten foods. Representative weights of foods such as bagels and muffins may increase over time, and if food codebooks and software fail to reflect such changes, energy intakes will be underestimated.

A major question concerns the extent to which energy underreporting is related to the reporting of other dietary components. A recent study used the 24-hour urine nitrogen technique to divide a group of individuals into "underreporters" and "others" (1). Underreporters (n=34) reported significantly less food energy, protein, fat, and sugars than the others (n=45) but similar levels of starch, fiber, and vitamin C. This research, which needs to be replicated, indicates that overall estimates may be downward biased for some, but not all, food components.

Until further research is completed, users of food intake survey data should assess energy reporting as a component of their analysis. The EI/REE ratio could be used as an assessment tool and/or as a control variable in a multivariate analysis. Consideration of the potential impact of energy underreporting is most critical for studies involving adult females and for overweight individuals.

Psychological aspects of energy reporting also need additional exploration (10). Hebert found that higher scores on a social desirability scale<sup>4</sup> were associated with lower energy reports with a 7-day dietary recall (9). Such a scale might be used in studies of energy reporting to develop a mechanism to help make adjustments for underreporting.

<sup>4</sup>Social desirability is the tendency of an individual to convey an image in keeping with social norms and to avoid criticism in a "testing" situation (9).

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# Dietary Patterns and Personal Characteristics of Women Consuming Recommended Amounts of Calcium

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Encouraging adequate calcium intakes by women is a current public health objective. To obtain information that could be used to promote this objective, this study examined dietary patterns and personal characteristics of women consuming their Recommended Dietary Allowance (RDA) of calcium compared with women who did not meet their RDA. The sample consisted of 2,261 nonpregnant, nonlactating women who participated in USDA's 1990-91 Continuing Survey of Food Intakes by Individuals—Diet and Health Knowledge Survey. Women whose diets met their RDA for calcium consumed significantly more milk products, fruit, and grains, less regular-calorie soda, and more of several essential nutrients, saturated fat, and sodium than did other women. All other characteristics equal, women were less likely to meet their calcium RDA from food sources if they were Black, less than 25 years of age, ate more food away from home, reported avoidance of all types of milk, and reported dietary intake in either the summer or fall. Factors positively related to meeting the RDA from food sources were working part time, taking vitamin-mineral supplements, reporting avoidance of whole milk only, being aware of a relationship between calcium intake and health, and reporting a higher number of milk group servings as being recommended daily. Implications for design and targeting of messages promoting calcium intake are discussed.



Adequate calcium intake has been identified as an important factor in preventing osteoporosis and may also play a role in the prevention of several other health conditions, including some other bone diseases, colon cancer, hypertension, and pre-eclampsia during pregnancy (26). Osteoporosis affects 25 million Americans, primarily women (26). Annual direct medical costs

associated with osteoporosis in American women have been estimated at \$5.2 billion (29). Yet, data suggest that most women's diets do not meet their current Recommended Dietary Allowance (RDA) for calcium (1). As a consequence, improvement of calcium intakes has received considerable emphasis as a public health priority (6). The NIH Consensus Development Conference on Optimal Calcium Intake has

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recommended development of health education materials and programs to promote increased calcium consumption. Increasing calcium intake among adolescents and adults is one of the health objectives for the Nation promoted by the U.S. Department of Health and Human Services' *Healthy People 2000* (39). The American Dietetic Association has made increasing women's awareness of osteoporosis and the lifestyle changes that can help prevent it a major component of their Nutrition and Health Campaign for Women (20). Other public and private groups are also working on projects to promote dietary changes that would increase calcium consumption (19, 24).

Amidst this emphasis on improving calcium intakes, particularly those of women, one concern that has been raised is whether increasing calcium intake is compatible with improving overall dietary quality. If a healthful diet is defined as one that contains adequate amounts of essential nutrients while meeting guidelines for moderation in consumption of such food components as fat, saturated fat, cholesterol, and sodium (9), previous research indicates that diets that are rich in calcium tend to be rich in other essential nutrients as well. However, these diets may be associated with excessive intakes of food components for which moderation is recommended.

Examining the issue of overall nutrient quality of higher-calcium versus lower-calcium diets, Barger-Lux et al. (2) and Holbrook and Barrett-Connor (14) both found that those with diets that were more calcium dense (i.e., had more calcium per 1,000 kilocalories (kcal) of intake) also had diets that had higher

densities of several other essential nutrients. However, Holbrook and Barrett-Connor also found that the high-calcium group's diet had a higher density of saturated fat than other groups.

Similarly, Nowalk and Caggiula (27) found that among a sample of middle-age premenopausal women, those whose diets met their RDA for calcium consumed greater amounts of total and saturated fat than those whose diets did not. These studies were done with local samples, and the results may not be generalizable to the American population. Nevertheless, they raise the concern that programs encouraging increased calcium intake may inadvertently result in increasing intakes of food components for which moderation is recommended.

Given that nutrition intervention is intended to promote an overall healthful diet, it is important, therefore, to examine not only the calcium adequacy but the overall diet quality of individuals before planning nutrition education efforts. Such an examination should provide educators with information that would be useful to them in developing dietary guidance that would lead to overall dietary improvement as well as improved calcium intakes.

A knowledge of personal characteristics associated with meeting or not meeting the calcium RDA should also be useful for targeting nutrition education efforts. Previous research has indicated that some personal characteristics seem to be associated with low calcium intakes. Data from several sources indicate that Black women tend to consume lower amounts of calcium than women of other races (18, 40).

Analysis of dietary intake data collected by the U.S. Department of Agriculture in 1985-86 from a national sample of women ages 19-50 indicated that, along with race, other factors independently associated with higher calcium intakes included higher education, higher income, being employed part time as opposed to being employed full time or not at all, being younger, being taller, being part of a household that included a child or children, being a participant in the Food Stamp program, living in a central city or suburban area as opposed to a non-metropolitan area, living in the Midwest or West as opposed to living in the Northeast or South, and being a regular supplement user (40). Both Lewis and Hollingsworth (17) and Haines et al. (13) found that, for women, eating a higher proportion of food away from home is associated with lower calcium intakes.

Nutrition educators would benefit from knowing how knowledge and attitudes related to calcium and calcium-rich foods influence food intake; however, national survey data capable of linking knowledge and attitudes to food and nutrient consumption have only recently become available. In a study of older women living in the Midwest, Chapman et al. (5) found that women with low calcium intakes were more likely to dislike milk, to believe that it disagreed with them, and to avoid drinking it. Examining attitudes toward milk consumption in a national data set would provide an opportunity to assess how generalizable these findings are to the broader population of American women.



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The purposes of this study are, therefore, to (1) examine overall food and nutrient consumption patterns of women whose 3-day diets meet or fail to meet their calcium RDAs for overall diet quality; and (2) identify socioeconomic, demographic, knowledge, attitude, and behavioral characteristics of women whose diets, over a 3-day period, meet the current calcium RDA for their age-sex group, using data from the USDA's 1990-91 Continuing Survey of Food Intakes by Individuals (CSFII) and Diet and Health Knowledge Survey (DHKS).

These surveys are unique in that, together, they provide the only federally collected data set capable of relating knowledge and attitudes concerning diet and health to actual dietary intake. The results may be used to indicate types of nutrition education messages that may be most effective in promoting adequate calcium intake and to target groups of women most likely to have lower-than-recommended calcium intakes.

## Methods

### Data and Sample

The CSFII was designed to obtain a nationally representative sample of households in the 48 conterminous United States and consists of an all-income and a low-income sample. In the all-income sample, all households, including low-income households, were eligible to be interviewed. For the low-income sample, participation was limited to individuals in households with a gross income for the previous month at or below 130 percent of the Federal poverty thresholds (36).

For the 1990-91 CSFII, trained interviewers visited each household and obtained socioeconomic, demographic, and health-related data on households and their members. In addition, the interviewers obtained 1 day of dietary intake data, using the 24-hour recall method, and household members were asked to complete a record of foods consumed on the 2 days following the 24-hour recall. Only those who provided the complete 3 days of dietary data were considered for this study.

For the DHKS, one member of each CSFII household was contacted about 6 weeks after dietary data were collected. Ideally, the individual contacted was the person who had identified himself or herself as the household's main meal planner/preparer. In some cases, interviewers were unable to contact the main meal planner/preparer; about 6 percent of DHKS respondents were not the main meal planner/preparer. Most interviews were conducted by telephone; in-person interviews were conducted when this was not feasible.

DHKS respondents were asked a series of questions on their knowledge, attitudes, and practices related to diet and health. Some questions that were particularly relevant to calcium intake included those on whether the respondents were aware that there were any health problems related to how much calcium a person eats, whether they avoided certain calcium-rich foods (all milk, whole milk, or cheese), and how many servings of milk products they believed they should eat daily.

**Given that nutrition intervention is intended to promote an overall healthful diet, it is important... to examine not only the calcium adequacy but the overall diet quality of individuals before planning nutrition education efforts.**

In 1990 and 1991, DHKS and 3-day food intake data were obtained from 2,960 respondents. From these, female meal planners age 18 years and over were selected to form the analysis data set. The small number of DHKS respondents who were not meal planners were excluded from the analysis because non-meal planners likely have less control over their food choices than meal planners. Pregnant and lactating women were also excluded because the purpose of this analysis was to examine factors influencing calcium intake over the long-term and pregnancy and lactation would be expected to create short-term increases in calcium intake (4).

The final analysis data set consisted of 2,261 female meal planners. To adjust for oversampling of low-income households and for differing response rates among population subgroups, DHKS sample weights were developed by USDA in cooperation with Iowa State University (34). Use of these weights for descriptive statistics is recommended, because the weighted sample more closely resembles the actual U.S. population (16); weighted data were used in this study to calculate all descriptive statistics.

## Measures of Dietary Intake

Survey respondents reported amounts of food consumed using common household measures. These amounts were converted to their gram weight equivalents. The results reported here represent the average amounts consumed over the 3 days of dietary intake reported by survey respondents. Foods are reported in terms of major groups—e.g., milk and milk products; and by selected subgroups—e.g., lowfat milks. Foods are

grouped by primary ingredient; for example, a hamburger with onions is placed in the meat group because meat is its primary ingredient. Food group consumption patterns are examined in terms of average amounts consumed over 3 days.

Energy (kilocalorie), fat, cholesterol, and nutrient intakes were calculated using USDA's Nutrient Data Base for Food Consumption Surveys (34). Nutrient intakes represent values from food consumption only; although survey participants answered questions on supplement use, nutrient intake from supplements was not quantified. Sodium values represent naturally occurring sodium, sodium added during food processing, and an assumed amount of sodium used in food preparation. Sodium values do not include salt added at the table.

In this study, nutrient intake is examined as a percent of the individual's RDA and in terms of nutrient density, defined as the amount of a nutrient in the diet per 1,000 kilocalories—a measure of diet quality that controls for differences in the absolute quantity. The National Academy of Sciences has established guidelines for recommended total intakes of cholesterol, sodium, and potassium (22). Here, cholesterol, sodium, and potassium intakes are examined both as total amounts consumed and in terms of density. Fat and saturated fat intakes are examined as percentages of total kilocalories, a measure that controls for differences in absolute quantity and also corresponds to current dietary guidance.

## Analysis of Food Consumption Patterns and Diet Quality

Mean food group intakes, nutrient intakes, and fat, saturated fat, cholesterol, sodium, and potassium intakes by meal planners who met their RDA for calcium were compared with the intakes of meal planners who did not. For this analysis, weighted data were used and statistical tests were conducted using the SUDAAN software package, which accounts for the effects of the complex design of the CSFII-DHKS surveys (32). T-tests were used for comparing means of the two groups.

## Analysis of Personal Characteristics Influencing Calcium Intake

Differences in socioeconomic, demographic, and personal characteristics between women who met their calcium RDA and those who did not were assessed using descriptive statistics. T-tests were used to compare means of continuous variables, and the chi-square test was used to compare distributions of categorical variables. Weighted data were used and analyses were conducted with the SUDAAN software package (32).

A logistic regression analysis was used to identify the personal characteristics independently associated with the probability of a meal planner meeting her RDA for calcium. In accordance with recommendations for statistical analysis of USDA food consumption survey data, unweighted data were used for this analysis (16). The analysis was conducted using the SPSS-X statistical software package (33).

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Independent variables selected for the analysis included race, RDA-based age group, the self-reported height of the individual and her body mass index (as calculated from self-reported height and weight), household income as a percent of the Federal poverty level, Food Stamp Program participation, education, employment status, presence of children in the household, region and urbanization level of residence, whether the individual was on a weight-loss diet, use of vitamin and/or mineral supplements, percent of total kilocalories consumed away from home over the 3-day period, whether the individual reported being aware of health problems related to calcium, how many servings of dairy products the individual believed she should consume each day, and whether the individual reported avoiding all milk, whole milk only, or cheese.

Race was included because previous research has indicated that it is associated with calcium intake; meal planners were categorized as members of either the White, Black, or "other" race groups ("other" includes Asians, Native Americans, Pacific Islanders, and any other races). Individuals were dichotomized into two age groups—those under 25 and those over 25 years of age—because the Food and Nutrition Board of the National Academy of Sciences has established an RDA for calcium that is higher for women 18 to 24 than for older women (23); the higher RDA may affect their likelihood of meeting recommended intake levels. Income, Food Stamp Program participation, education, employment status (full time, part time, not employed), presence of children in the household, region and urbanization level of residence, and use of vitamin and/or

mineral supplements were also included because previous research has indicated their potential significance in influencing calcium intake.

The percentage of total kilocalories consumed away from home over the 3-day period was used as a measure of the importance of eating away from home in the diet, since this has been associated with lower calcium intakes in some studies. The variables on awareness of health problems related to calcium, how many servings of dairy products the individual believed she should consume each day, and whether the individual reported avoiding all milk, whole milk only, or cheese have not previously been studied in relation to the calcium adequacy of women's diets using a large national data set, because they have only recently been added to national food consumption surveys. They were included because of the potential usefulness of information on their influence on calcium intake for nutrition education.

Variables assessing temporal effects on intake—season in which intake was reported and whether weekend eating was reported—were included as control variables because previous research has indicated that they can affect food consumption (12). Another factor that needs to be controlled is individual differences in total energy intake, since at higher caloric levels an individual may be more likely to meet the calcium RDA.

Unfortunately, the use of energy intake as an independent variable in a multivariate equation is problematic because within-individual variability in energy intake introduces error that will produce biased coefficients (3). Therefore, several variables that proxy differences in

**Women whose diets met their RDA for calcium consumed more than three times as much lowfat milk as other women and more than six times as much skim milk.**

energy need were used as control variables. These include: Self-reported height and body mass index, as calculated from self-reported height and weight, since larger individuals are likely to consume more energy; being on a weight-loss diet; and whether individuals reported any days with either lower-than-usual or higher-than-usual dietary intakes.

## Results

### Description of Sample

Of the 2,261 women studied, 442 or 19 percent met their calcium RDA. After applying survey weights to obtain a population estimate, 21 percent of adult female meal planners were estimated to have diets that met their RDA for calcium. The group that met its calcium RDA was significantly less likely to include younger women (table 1). Six percent of meal planners with lower calcium intakes were below 25 years of age; only 2 percent of those with higher calcium intakes were in that age group. Women with higher calcium intakes were significantly taller, averaging 64.7 inches in height, compared with an average of 64.0 inches for the low calcium group.

The educational level and employment status of the two groups also differed significantly. Twenty-two percent of those with lower calcium intakes had not completed high school, whereas 37 percent were high school graduates, and 41 percent had at least some college education. Of those with higher calcium intakes, 13 percent had not completed high school, 35 percent were high school graduates, and 52 percent had at least some college education. Assessing

**Table 1. Descriptive characteristics of women with diets meeting or not meeting their RDA for calcium<sup>1</sup>**

Variable	Dietary calcium below RDA (n = 1,819)	Dietary calcium RDA or above (n = 442)	Significance
Income as percent poverty	345	430	
Body mass index (BMI)	25.2	24.8	
Height in inches	64.0	64.7	*
How many dairy servings should consume	2.2	2.5	**
	<i>Percent</i>		
Race			
White	83	90	
Black	13	6	
Other	4	4	
RDA age group			**
< 25 years	6	2	
> 25 years	94	98	
Education			**
< High school	22	13	
High school graduate	37	35	
At least some college	41	52	
Employment status			*
Full time	36	40	
Part time	15	23	
Not employed outside home	49	37	
Food Stamp household	7	7	
Children present	39	43	
Urbanization			
City	30	29	
Suburban	46	48	
Nonmetropolitan	24	24	

table continued



**Table 1. Descriptive characteristics of women with diets meeting or not meeting their RDA for calcium<sup>1</sup> (cont'd)**

Variable	Dietary calcium below RDA (n = 1,819)	Dietary calcium RDA or above (n = 442)	Significance
<i>Percent</i>			
Region			
Northeast	21	22	
Midwest	23	28	
South	37	31	
West	19	20	
On weight loss diet	6	7	
Take vitamin-mineral supplement	35	42	
Percent food away from home	22	20	
Aware of health problems related to calcium	65	76	**
Avoid all milk	17	7	**
Avoid whole milk only	47	65	**
Avoid cheese	17	11	*
Season			
Spring	26	26	
Summer	26	22	
Fall	24	25	
Winter	25	28	
Lower than usual reported intake	29	27	
Higher than usual reported intake	14	13	
Weekend day included in 3-day report	55	62	

<sup>1</sup>Weighted data.

\* p < .05.

\*\* p < .01.

employment status, 36 percent of women with lower calcium intakes were employed full time, 15 percent were employed part time, and 49 percent were not employed outside the home. Forty percent of those with higher calcium intakes were employed full time, 23 percent part time, and 37 percent had no outside employment.

There were several differences between the two groups in terms of knowledge and attitudes related to calcium intake. A significantly higher percentage of women in the higher calcium group were aware that there were any health problems related to calcium intake. They were also likely to believe they should consume more servings from the dairy group daily. They were more likely to avoid whole milk only, but less likely to avoid all milk or to avoid cheese.

### Food Group Consumption Patterns

Women whose diets met their RDA for calcium consumed significantly more milk and milk products than women whose diets did not (table 2, p. 40). This is not surprising, considering that milk products are the major source of calcium in the American food supply (8). Milk products vary in their calcium concentration; therefore, total intake of milk products is reported both as grams and as calcium equivalents (the amount in grams of fluid whole milk that has the same quantity of calcium as these milk products).



Since the USDA/DHHS Food Guide Pyramid defines servings from the Milk, Yogurt, and Cheese Group on the basis of the calcium content of 1 cup of milk (37), calcium equivalents can be used to estimate intake of milk products in relationship to Food Guide Pyramid serving recommendations. Women in the lower calcium group averaged an intake of 159 calcium equivalents per day from milk and milk products or approximately two-thirds of a serving from the Milk, Yogurt, and Cheese Group. Women who met their calcium RDA obtained 559 calcium equivalents from milk products, or approximately 2.3 servings, an amount within the 2-3 servings per day recommended by the Food Guide Pyramid and slightly less than the 2.5 servings per day that these women, on average, believed they should consume.

Women who met their calcium RDA also consumed significantly more of all of the subgroups within this category that were examined. The differences were particularly striking for lowfat and skim milks. Women whose diets met their RDA for calcium consumed more than three times as much lowfat milk as other women and more than six times as much skim milk. Women whose diets met their calcium RDA also consumed significantly more fruit, grain products, and sugars and sweets than other women. Women who did not meet their calcium RDA consumed more regular sodas.

**Table 2. Mean consumption of major food groups and selected subgroups by women with diets meeting or not meeting their RDA for calcium<sup>1</sup>**

Food group intakes	Dietary calcium below RDA (n = 1,819)	Dietary calcium RDA or above (n = 442)	Significance
Total milk and milk products (CaEq) <sup>2</sup>	159	559	**
<i>Grams</i>			
Total milk and milk products	129	463	**
Whole milk	26	91	**
Lowfat milk	46	145	**
Skim milk	19	121	**
Cheese	10	20	**
Milk desserts	13	29	**
Yogurt	5	20	**
Total vegetables	180	202	
Dark green vegetables	11	17	
Legumes	15	19	
Total fruit	127	173	**
Citrus juices	45	51	
Total grain products	206	281	**
Meat, poultry, fish, eggs, nuts	176	180	
Fats and oils	14	16	
Sugars and sweets	15	22	*
Total nonalcoholic beverages	798	705	
Coffee	367	359	
Tea	164	119	
Regular sodas	146	99	**
Lo-cal sodas	82	78	
Total alcoholic beverages	31	40	

<sup>1</sup>Weighted data.

<sup>2</sup>CaEq = calcium equivalents.

\* p < .05.

\*\* p < .01.

## Nutrient Intakes

Women who met their calcium RDA consumed significantly more kilocalories than those who did not—1,861 kcal/day compared with 1,373 kcal/day—although both of these levels are below the average energy allowances recommended for adult women (23). These low intake levels may reflect some underreporting, a problem that is known to plague self-reported dietary intake data (21).<sup>1</sup>

When nutrient intakes were examined as a percent of recommendations (RDA), women whose diets met their calcium RDA consumed significantly more of all vitamins and minerals examined, as well as protein (table 3). On average, both groups met their RDAs for protein, riboflavin, phosphorus, folate, thiamin, niacin, vitamin C, and vitamin B-12. Neither group met their RDA for zinc, although the group who met their RDA for calcium averaged 97 percent of their zinc RDA, significantly higher than those who did not meet the calcium RDA, whose average intake of zinc was 66 percent of their RDA. The group who met their RDA for calcium also met their RDAs for magnesium, vitamin E, vitamin B-6, iron, and vitamin A, but the other women did not.

Some of the nutrient intake differences seen could reflect the higher average caloric intakes of women whose diets met their calcium RDA. However, when the nutrient densities of the diets of the two groups were compared, the women

**Table 3. Mean energy, nutrient intakes, and nutrient densities of intakes, by women with diets meeting or not meeting their RDA for calcium<sup>1</sup>**

Variable and nutrient density	Dietary calcium below RDA (n = 1,819)	Dietary calcium RDA or above (n = 442)	Significance
<b>Variable</b>			
Energy (kcal)	1,373	1,861	**
<i>Percent RDA</i>			
Protein	114	156	**
Zinc	66	97	**
Magnesium	70	106	**
Iron	86	116	**
Phosphorus	103	173	**
Thiamin	106	149	**
Riboflavin	100	171	**
Niacin	118	148	**
Folate	105	156	**
Vitamin B-6	78	113	**
Vitamin B-12	186	279	**
Vitamin C	129	172	**
Vitamin A	97	170	**
Vitamin E	74	116	**
<b>Nutrient density (nutrient/1,000 kcal)</b>			
Protein (g)	41.9	43.0	
Calcium (mg)	363.3	621.5	**
Zinc (mg)	5.9	6.6	**
Magnesium (mg)	148.8	166.4	**
Iron (mg)	7.8	8.1	
Phosphorus (mg)	625.5	777.9	**
Thiamin (mg)	0.8	0.9	
Riboflavin (mg)	0.9	1.2	**
Niacin (mg)	12.4	11.6	*
Folate (µg)	143.0	155.5	*
Vitamin B-6 (mg)	0.9	1.0	*
Vitamin B-12 (µg)	2.7	3.1	
Vitamin C (mg)	58.8	57.3	
Vitamin A (RE) <sup>2</sup>	593.1	766.5	**
Vitamin E (TE) <sup>3</sup>	4.3	5.2	*

<sup>1</sup>Weighted data.

<sup>2</sup>RE = retinol equivalents.

<sup>3</sup>TE = tocopherol equivalents.

\* p < .05.

\*\* p < .01.

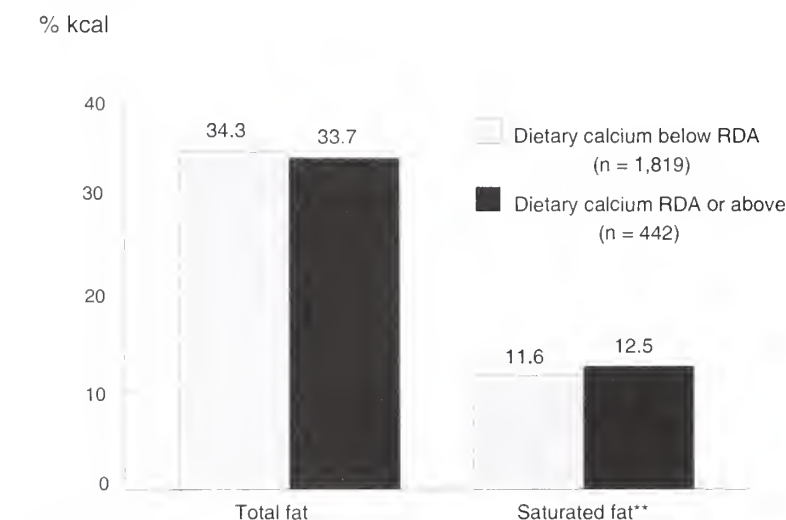
<sup>1</sup>See also the article by Riddick in this issue.

who met their calcium RDA were found to have diets that were more nutrient dense for zinc, magnesium, phosphorus, riboflavin, niacin, folate, vitamin B-6, vitamin A, and vitamin E, as well as calcium (table 3). Therefore, many of the differences in diet quality between the two groups appear to be due to qualitative as well as quantitative differences in intake.

### Fat, Saturated Fat, and Cholesterol Intakes

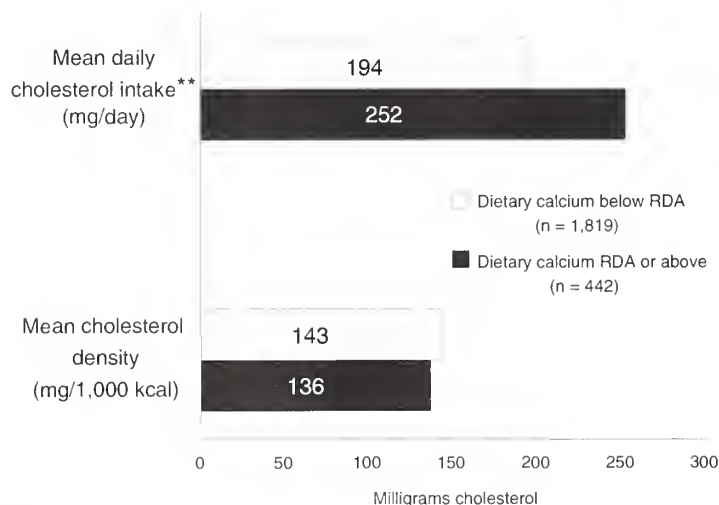
Women whose diets met their calcium RDA averaged 33.7 percent kilocalories from fat, compared with 34.3 percent for other women; this difference was not significant (fig. 1). Women whose diets met their calcium RDA did consume significantly more saturated fat than other women, 12.5 percent, compared with 11.6 percent. For both groups, these intakes are above levels recommended by the *Dietary Guidelines for Americans* (38). Women whose diets met their calcium RDA also consumed significantly more cholesterol than other women, although neither group exceeded the 300 mg/day limit recommended by the National Academy of Sciences (fig. 2). On a density level, there was no significant difference in cholesterol intake between the two groups, indicating that the difference in absolute intake between the two groups was primarily due to the higher reported caloric intakes of the women who met their calcium RDA.

**Figure 1. Mean percent calories from fat and saturated fat by women with diets meeting or not meeting their RDA for calcium<sup>1</sup>**



<sup>1</sup>Weighted data.  
 \*\* p < .01.

**Figure 2. Mean daily cholesterol intakes and cholesterol densities of women with diets meeting or not meeting their RDA for calcium<sup>1</sup>**



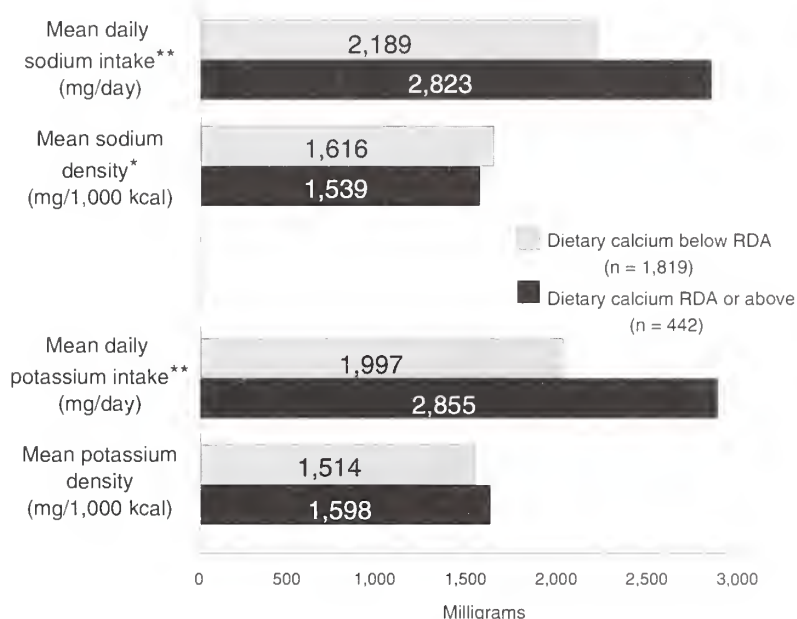
<sup>1</sup>Weighted data.  
 \*\* p < .01.

## Sodium and Potassium Intakes

On an absolute level (mg/day), women whose diets met their calcium RDA consumed more sodium than did other women; their total intake was above the 2,400 mg limit recommended by the National Academy of Sciences (fig. 3). On a density level, the difference was reversed; women with lower calcium intakes had significantly higher sodium densities than women who met their RDA for calcium. The difference in absolute intake and sodium density is probably due to the higher caloric intakes of women who met their RDAs for calcium. If the recommended limit of 2,400 mg of sodium is divided by the average Recommended Energy Allowances (REAs) for women established by the National Academy of Sciences (23), women under age 51, with a mean REA of 2,200 kcal/day, should consume no more than 1,091 mg sodium per 1,000 kcal, and women ages 51 and above, with a mean REA of 1,900 kcal/day, should consume no more than 1,263 mg sodium per 1,000 kcal, in order to meet this recommendation. Mean sodium densities of both women with lower and higher calcium diets were well above those limits.

Women with higher calcium intakes also had higher potassium intakes, but there was no significant difference in the potassium density of the diets of the two groups. Neither group met the National Academy of Sciences intake recommendation of 3,500 mg of potassium daily. In order to meet the potassium recommendation, women consuming their average recommended energy allowance would have to consume at least 1,591 to 1,842 mg potassium per 1,000 kcal, depending on their age. Women whose diets met their calcium RDA had potassium densities that fell within this range, but other women did not.

**Figure 3. Mean daily sodium and potassium intakes and densities of women with diets meeting or not meeting their RDA for calcium<sup>1</sup>**



<sup>1</sup> Weighted data.

\* p < .05.

\*\* p < .01.

## Characteristics Associated With Meeting Calcium Intake Recommendations

The likelihood of a female meal planner meeting her calcium RDA from food sources was negatively associated with being Black, being less than 25 (and therefore having a higher calcium RDA), eating more food away from home, avoidance of all milk, and having reported dietary intake in either the

summer or fall (table 4, p. 44). It was positively associated with working part time rather than working full time or being unemployed, taking vitamin-mineral supplements, being aware that calcium intake is associated with health status, believing one should consume a higher number of servings of milk, and avoiding whole milk.

## Discussion

The results of this study reinforce the findings of other researchers but also provide new information that may be useful to those seeking to improve the calcium intakes of women. Analysis of food consumption patterns indicated that women who failed to meet their calcium RDA consumed less milk and milk products than those who did meet their RDA, approximately two-thirds of one serving per day, compared with 2.3 servings per day. They also consumed more regular soda. Research on diets of adolescents has suggested that consumption of sodas may displace milk in their diets (10, 30). It appears that this is true for adult women as well. Those seeking to improve women's calcium intakes may wish to design messages targeting beverage consumption or messages that promote increased consumption of alternative calcium sources for women who drink sodas instead of milk. Although replacing some soda with milk may not be sufficient to ensure that women meet their calcium RDA, it should narrow the gap between consumption and recommendations.

Findings from the analyses of consumption of nutrients and food components for which moderation is recommended tended to correspond to those of previous researchers. Women who met their calcium RDA tended to have higher quality diets in terms of nutrient intakes, but their diets also contained significantly higher proportions of saturated fat than did diets of other women. Nutrition education efforts directed toward improving women's calcium intakes should also include advice on how to moderate saturated fat, for example, by emphasizing lowfat dairy products. The average sodium intake of women who met their calcium RDA

**Table 4. Logistic regression coefficients for variables related to a female meal planner's likelihood of meeting her calcium RDA<sup>1</sup>**

Independent variable	Estimated coefficient
Race (base = White)	
Black	-0.69**
Other	-0.11
Age <25 years (base = >25 years)	-0.93**
Height	0.04
Body mass index	-0.02
Household income as a percent of Federal poverty level	0.01
Food Stamp Program participation	-0.04
Education (base = < High school education)	
High school graduate	0.07
At least some college	0.10
Employment status (base = Not employed)	
Employed full time	0.10
Employed part time	0.39*
Presence of children in the household	0.16
Region of residence (base = South)	
Northeast	0.18
Midwest	0.02
West	-0.18
Urbanization (base = Suburban)	
Central city	0.13
Nonmetropolitan	0.01
On weight-loss diet (base = not on weight-loss diet)	0.28
Use vitamin/mineral supplements every day or almost every day (base = use vitamin/mineral supplements every so often or not at all)	0.48**
Percent of total calories eaten away from home	-0.01**
Aware of health problems related to how much calcium you eat (base = not aware)	0.28*
Number of servings of dairy products individual believes should be consumed	0.24**
Avoid all milk (base = do not avoid all milk)	-1.05**
Avoid whole milk only (base = do not avoid whole milk)	0.31*
Avoid cheese	0.09
Season intake reported	
Spring	-0.33
Summer	-0.38*
Fall	-0.39*
Weekend day included in 3-day report (base = no weekend day)	-0.01
At least 1 day of lower than usual intake	-0.22
At least 1 day of higher than usual intake	0.15
Constant	-4.48**
Chi-square statistic	159.82*

<sup>1</sup> n = 1,825; other cases removed because incomplete data on independent variables.

\* p < .05.

\*\* p < .01.



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was also significantly higher than that of other women and exceeded recommendations by the National Academy of Sciences. Since milk products, whether lowfat or regular, naturally contain sodium, women who get most of their calcium from milk products may have to be especially careful to limit the overall sodium content of their diets.

The results of the logistic regression analysis identify socioeconomic and personal characteristics of women most likely to be associated with having a lower-than-recommended calcium intake. These findings can provide insights into what groups of women should be especially targeted for calcium promotion efforts and what types of promotional messages might be most applicable to their circumstances.

Consistent with previous research, it was found that Black women were more likely not to meet their RDA for calcium, perhaps due to a greater prevalence of lactose intolerance. Black women are less likely to be at risk for osteoporosis than White or Asian women; however, calcium is an essential nutrient that performs many other functions in the body, and its role in health problems for which Black women are not at less risk (e.g., high blood pressure) is still under study. Therefore, development of effective strategies to help Black women meet their calcium RDA is indicated.

Another factor associated with decreased likelihood of meeting one's calcium RDA was being less than 25 years of age. Women in this age group have a higher RDA than older women—1,200 mg/day compared with 800 mg/day. This higher level was established by the National Academy of Sciences because they concluded that peak bone mass is not attained before the age of 25 years,

and it is therefore important to consume sufficient calcium to promote optimal mineral deposition through age 24. Targeting younger women for calcium promotion messages is indicated.

Women who worked part time were more likely to meet their calcium RDA than women who either worked full time or were unemployed. This is consistent with previous research (40). This unusual, but consistent, finding is worthy of more exploration. It may have something to do with the characteristics of women who are likely to engage in part-time work. Alternatively, it may have to do with the nature of engaging in part-time work. Some researchers, for example, have suggested that part-time work offers women a balance between the rewards of outside work and home that promotes increased personal satisfaction and improved personal functioning (28).

Among behavioral characteristics studied, eating more food away from home was associated with decreased likelihood of a woman's meeting her calcium RDA. Given the rise in eating away from home that has occurred in the past decade (31), this issue deserves serious emphasis in efforts to promote calcium intake.

Consumers frequently are less concerned about the nutritional value of their food choices when they are eating out (25). Promotional efforts should emphasize choice of calcium-rich foods when eating out and remind women that the nutritional content of food consumed away from home is just as important as that of food consumed at home. In addition, calcium-rich products need to be provided in forms that are convenient and acceptable to consumers.

**For optimal effectiveness, calcium promotion efforts should... address lifestyle issues such as eating away from home, employment effects, and food preferences and aversions...**

Lewis and Hollingsworth (17) found that young women stated that when eating out, they frequently ate meals they could carry and eat elsewhere. Calcium-rich foods that are conveniently packaged for "eating on the run" may encourage calcium intake away from home. Lewis and Hollingsworth (17) also found that many young women disliked drinking milk out of cartons, the form in which it is frequently provided in fast food and other food service establishments. Serving milk in a glass may increase its acceptability.

Routinely taking vitamin-mineral supplements was a behavioral characteristic associated with increased likelihood of meeting the calcium RDA. Previous research has generally found supplement use to be associated with higher nutrient intakes (40). Few of the women studied reported taking calcium as a specific nutrient supplement (only 7 percent took calcium as a single-nutrient supplement; most supplement users took a multivitamin or multi-vitamin-mineral preparation). Therefore, the association of supplement use with calcium intake is probably a reflection of a higher level of general health concern among supplement users and a better quality diet in general.

Avoidance of all milk and avoidance of whole milk only were both significantly related to the probability of a woman meeting her calcium RDA but in opposite ways. Avoidance of all milk was associated with decreased likelihood of meeting the RDA, whereas avoidance of whole milk only was associated with an increased probability of meeting it.

Previous research (11) has demonstrated that women who stated that they avoided whole milk only consumed larger

amounts of lowfat and skim milks than other women. Thus, their behavior might be better characterized as substitution of one form of milk for another. Besides having higher calcium intakes than other women, the women who avoided whole milk only and substituted lowfat and skim milks had lower fat and saturated fat intakes as a percent of kilocalories and lower cholesterol densities than women who avoided no milks (11). This supports promotion strategies than emphasize consumption of lowfat dairy products, such as the "Trim with Skim" campaign from the National Fluid Milk Processor Promotion Board (24) and the "One Percent or Less" campaign from Center for Science in the Public Interest (7), as well as continued support for development of lowfat dairy products (15).

Avoidance of all milk, however, does not seem to be associated with substitution of other calcium-rich food sources in amounts sufficient to meet the RDA. Lack of knowledge may be one factor. Chapman et al. (5) noted that the older women in their study had little or no knowledge of calcium-rich foods other than milk products. More investigation of the reasons why these women are avoiding all milk and appropriate education on alternative calcium sources is indicated.

Finally, both awareness that calcium intake is related to health and belief that one should consume more milk group servings were found to be related to a woman's likelihood of meeting her RDA. This argues for the continuing value of efforts to educate the American population on basic diet-health relationships and to provide practical guidance on how to achieve a healthful diet.

## Conclusions

Taken together, these results provide useful insights into the design of nutrition promotion messages and strategies for promotion of increased calcium intake. Basic nutrition education messages on the relationship of calcium to health and the recommended servings of calcium-rich foods to be consumed daily can be important in improving calcium intakes.

For optimal effectiveness, calcium promotion efforts should also address lifestyle issues such as eating away from home, employment effects, and food preferences and aversions—such as avoidance of milk. Because higher calcium intakes may be associated with increased consumption of saturated fat and sodium, calcium promotion efforts should include tips on moderating saturated fat and sodium in the total diet. Given that many women appear to find use of lowfat dairy products a preferable choice, and this choice seems to be associated with a diet higher in calcium and lower in fat, promotion of lowfat dairy products may be an effective strategy.

Finally, some demographic groups appear to be more at risk of consuming lower-than-recommended calcium amounts than others and these groups should be targeted for special promotion efforts. Of especial concern are young women (less than 25 years of age) since they are less likely to meet their calcium RDA and calcium intake before age 25 has been reported to be critical for peak bone mass development.

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# The American Diet: Health and Economic Consequences

Four of the 10 leading causes of death in the United States are linked to diet. Heart disease, cancer, stroke, and diabetes account for more than 1.4 million deaths each year, nearly two-thirds of the U.S. total (see table). Diet also plays a role in other health conditions such as overweight, hypertension, and osteoporosis, which can reduce quality of life and productivity and contribute to premature death.

Together, these seven diet-related health conditions cost society an estimated \$250 billion each year in medical costs and lost productivity. Although the extent to which these costs might be reduced by an improved diet cannot be calculated precisely, some researchers estimate that proper diet might forestall at least 20 percent of the annual deaths from heart disease, cancer, stroke, and diabetes.

Although genetic predisposition increases some people's risk for these chronic diseases, behavior within a person's control, such as diet, smoking, and regular exercise can also change the likelihood of contracting them. Diets high in calories, fat, saturated fat, cholesterol, and salt and low in such fiber-containing foods as fruit, vegetables, and whole-grain products are associated with risk of those diseases.

## Diseases of the Heart

According to the National Center for Health Statistics, one-third of all deaths in the United States in 1993 were

attributed to diseases of the heart. Of these, 66 percent were attributed to coronary heart disease (CHD), the type of heart disease commonly associated with diet.

Although genetics plays an important role in an individual's risk of CHD, studies show that environmental factors are also important. Major risk factors for CHD that can be modified include high blood cholesterol levels, hypertension, cigarette smoking, and physical inactivity. Blood cholesterol levels in some people can be influenced by their intake of saturated fat and cholesterol. Diet can also influence other risk factors for CHD, such as overweight and diabetes.

Mortality from CHD has decreased approximately 50 percent in the last two decades. Improved medical care and changes in lifestyles to reduce risk factors have contributed substantially to this decline. For example, blood cholesterol levels declined an average of about 8 percent between 1960-62 and 1988-91. Although the observed reduction in average blood cholesterol levels is consistent with the observed reduction in average intake of total fat and saturated fat during this period, other nondietary, cholesterol-lowering behaviors—such as the increased use of cholesterol-lowering drugs, post-menopausal estrogen replacement therapy, and lower-dose oral contraceptives—also were common, making it difficult to determine the isolated effect of changes in dietary patterns.

## Cancer

Over 500,000 people died of cancer in the United States in 1993. The American Cancer Society estimates that overall costs for cancer amount to \$104 billion each year—a combination of direct medical costs and lost productivity

## Four of the 10 leading causes of death in the United States are diet related

Cause of death, 1993	Deaths	Share of all deaths
1. Heart disease	739,860	32.6
*Coronary heart disease	489,970	21.6
2. *Cancer	530,870	23.4
3. *Stroke	149,740	6.6
4. Chronic obstructive pulmonary diseases	101,090	4.5
5. Accidents and adverse effects	88,630	3.9
6. Pneumonia and influenza	81,730	3.6
7. *Diabetes	55,110	2.4
8. HIV infection	38,500	1.7
9. Suicide	31,230	1.4
10. Homicide and legal intervention	25,470	1.1
All causes	2,268,000	100.0

\* Diet-related causes of death.

Source: Frazao, E., 1995, *The American Diet: Health and Economic Consequences*, U.S. Department of Agriculture, Economic Research Service, Agriculture Information Bulletin No. 711.

associated with morbidity and premature mortality.

Seventy percent of all cancer deaths in 1993 involved those age 65 years and older; however, the economic losses associated with cancer were largest for the younger age groups. People 45-64 years old accounted for 34 percent of all cancer deaths but 62 percent of lost earnings.

Although genetics is an important factor in cancer risk, the risk for developing particular types of cancer can probably be greatly reduced. In an extensive 1981 review of the avoidable risks for cancer, Doll and Peto estimated that cancer death rates in the United States can be reduced by as much as 35 percent by "practicable dietary means." The estimate included the effects of:

Overnutrition and overweight, ingestion of naturally occurring carcinogens, carcinogens produced by cooking or storage, and cancer-enhancing or cancer-inhibiting substances that affect the formation of carcinogens in the body.

Diets high in total fat and low in fiber-containing foods are associated with increased risk of certain types of cancer: Colorectal cancer, breast cancer, and prostate cancer. However, the precise dietary changes associated with a reduced risk of cancer remain controversial. Researchers caution that given the high correlation between fat intake and intake of certain nutrients and food groups, the reduced risk of cancer attributed to a low fat intake may not be due to the low fat intake but to a high intake of something else such as fruits, vegetables, or vitamin C.

## Stroke

Stroke (cerebrovascular disease) affects over 500,000 people each year and killed over 149,000 people in 1993. Stroke is also the leading cause of serious disability and accounts for half of all patients hospitalized for acute neurological disease. Over 3 million people in the United States suffer from stroke-related disabilities, at an annual cost of \$19.7 billion. Risk factors include a diet high in saturated fat and cholesterol as well as overweight, diabetes, and hypertension. Mortality rates from stroke have decreased by 57 percent in the past two decades, and some of this improvement is likely associated with improvements in the detection and treatment of hypertension.

## Diabetes

Diabetes is the seventh leading cause of death in the United States, directly responsible for nearly 50,000 deaths in 1991. Diabetes affects 13 to 14 million people in the United States, half of whom are not even aware they have it. In addition, mortality statistics tend to underreport the true impact of diabetes.

The American Diabetes Association estimates that diabetes contributes to at least an additional 100,000 deaths each year. For example, diabetes is the single leading cause of kidney disease and is a risk factor for CHD and stroke. Diabetes is also the leading cause of blindness and can cause nerve damage and amputations, as well as birth defects in babies born to diabetic women. The American Diabetes Association estimates that the total economic costs of diabetes add up to more than \$90 billion annually.

The only therapeutic interventions known to be effective in non-insulin-dependent diabetes are the maintenance

of desirable body weight and exercise. About 80 percent of people with diabetes Type II are overweight, and it is estimated that half of Type II diabetes cases can be prevented by controlling overweight.

### Overall Cost to Society

The health conditions described above, together with overweight, hypertension, and osteoporosis, cost society an estimated \$250 billion each year in medical costs and productivity. Deaths from heart disease and stroke have declined significantly in the past few decades, but those from cancer and diabetes have not. Even with the dramatic declines in mortality from heart disease and stroke, nearly two-thirds of deaths in the United States today are still attributable to the same four diet-related conditions. Changes in diet would not eliminate these chronic conditions but could reduce the current health burden associated with them.

### How Healthful Are Our Diets?

Although there is still much that scientists do not know about how diet affects health, there is a consensus on the components of a healthful diet. The *Dietary Guidelines for Americans*, published by the U.S. Departments of Agriculture (USDA) and Health and Human Services (DHHS), summarizes these components.

Data from USDA's 1989 and 1990 Continuing Survey of Food Intakes by Individuals (CSFII) and the 1977-78 Nationwide Food Consumption Survey (NFCSS) confirm that diets are slowly moving toward the *Dietary Guidelines*; that is, toward lower fat, higher carbohydrate diets. However, progress has not always been positive. For example, although the proportion of food energy

that comes from total fat and saturated fat has been declining, the proportion of adults who are overweight has been increasing.

Although awareness of the diet-health link has increased, and many consumers report changing their diets to make them more healthful, most diets are still falling short of the *Dietary Guidelines*. Possible reasons for this lack of compliance may be the lack of belief consumers have that changing their diet is worth it and that chronic disease is within their control. In addition, lack of motivation, lack of knowledge, income constraints, convenience, and cultural habits may be obstacles for consumers. Also, ineffective changes in the diet, such as trading one source of fat for another, may also be a reason why Americans are still falling short of the *Dietary Guidelines*.

The food industry has responded to consumer interest in nutrition by introducing a multitude of new food products with reduced fat content. The increased availability of lower fat products and leaner meats has probably contributed to the overall decline in total fat intake in the United States in the past decade. In addition, new nutrition labels have provided additional incentives for manufacturers to reformulate their products and have made it easier for consumers to choose a more healthful diet.

### What USDA Is Doing to Help Americans Improve Their Dietary Patterns

Consumers have much to gain from improving their dietary patterns. Therefore, there is a pressing need to expand consumers' knowledge about food, nutrition, and choosing a healthful diet. USDA is responsible for nutrition education and food assistance programs

and has a number of activities aimed at helping consumers improve their food consumption choices.

The *Dietary Guidelines* is the Federal Government's basic document that provides advice to Americans on what to eat to stay healthy. The Guidelines are reviewed and published every 5 years, the 4th edition having been released in 1995. To help consumers apply the information, USDA developed the Food Guide Pyramid, which is also supported by DHHS. In addition, the new nutrition labeling regulations, issued by both the Food and Drug Administration (FDA) and USDA, mandate nutrition labels on most processed foods as of August 1994. The new regulations update the list of nutrients that appear on the labels, standardize serving sizes, define nutrient content claims, and provide a mechanism for evaluating health claims.

Other efforts include nutrition education efforts, improved nutritional content of school lunches and breakfasts, nutrition monitoring, biomedical research, and social sciences research. In addition, USDA, DHHS, and the U.S. Agency for International Development are involved in the development of the U.S. Plan of Action to address national nutrition priorities in response to the 1992 International Conference on Nutrition, sponsored by the Food and Agriculture Organization of the United Nations and the World Health Organization.

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Source: Frazao, E., 1995, *The American Diet: Health and Economic Consequences*, U.S. Department of Agriculture, Economic Research Service, Agriculture Information Bulletin No. 711.



# Influence of OASDI and SSI Payments on Poverty Status of Families With Children

This article examines the economic status of families with children that received Old-Age, Survivors, and Disability Insurance (OASDI) or Supplemental Security Income (SSI) payments in May 1990. The focus is on families in which a child is the beneficiary but also includes families with children in which an adult is the only eligible recipient. An earlier study concluded that OASDI and SSI benefits play a significant role in reducing poverty among families with children. This study examines why benefits lift some families from poverty while others remain below the poverty line.

The study was conducted by matching records from the second wave of the 1990 Survey of Income and Program Participation (SIPP) with Master Beneficiary Records (MBR) and Supplemental Security Records (SSR) from the Social Security Administration. Matching these records allowed a more detailed examination of the impact of OASDI and SSI payments on families with children.

## Benefit Eligibility

Monthly OASDI benefits are payable to an individual under age 18 who is the unmarried child or eligible dependent grandchild of a retired or disabled worker, or of a deceased worker who was fully or currently insured at the time of death. SSI, a means-tested

program, provides benefits to aged, blind, or disabled persons with limited income and resources.<sup>1</sup>

## Poverty Rates

The authors note that child poverty increased from 20.1 percent in 1989 to 22.5 percent in 1993, with poverty rates highest among children in female-headed families (52.5 percent). This increase has been attributed primarily to changes in family structure. The decline in real wages of people with limited education was a contributing factor.

## OASDI

There were 2.8 million OASDI families with children. Forty-one percent had only adult beneficiaries, compared with 32 percent that had a child who received survivor benefits and 27 percent that had a child who received benefits because of a retired or disabled worker. Among families with a child beneficiary, over half (55 percent) received survivor benefits. The poverty rate for OASDI families with children who received benefits on the account of an aged or disabled worker was higher (30 percent) than that for families with children who received survivor benefits (13 percent) and those without child beneficiaries (19 percent).

The mean income (in May 1990) of all families with children that received OASDI was \$2,837 (see table). Families with child beneficiaries receiving old-age or disability benefits had lower average income (\$2,399) than those receiving survivor benefits (\$2,884).

<sup>1</sup>Eligibility is determined at the individual level; however, the income and resources of ineligible spouses and the parents of eligible children are considered in determining eligibility based on need.

Thus, families with children who received survivors benefits, especially those in which the surviving parent was remarried, were less likely to have income below the poverty threshold (see figure) than other families with children who received OASDI benefits. The mean OASDI benefit did not vary greatly by benefit source, but large differences were observed between families headed by a single adult (\$288) and those headed by a couple (\$842) with at least one child receiving old-age or disability benefits.

Almost 18 percent of families with children that received OASDI benefits were eligible for food stamps. Participation in the Food Stamp program was higher among families headed by a single adult and highest among such families with a child entitled to old-age or disability benefits (47 percent). Among families with a child receiving survivor benefits, 13 percent of families headed by a single adult (compared with 9 percent of families headed by a couple) received food stamps. In families with children where only adults receive benefits, 22 percent of families headed by a single adult versus 13 percent of those headed by a couple received food stamps.

## SSI

There were 904,000 families with children under age 18 that included at least one person who was eligible for SSI payments in May 1990. Over two-thirds (69 percent) of these families had only adult recipients. The poverty rate for SSI families with children was 41 percent.

**Mean monthly income for families with children under age 18, by type of family and source of income, May 1990**

Type of family	Income from all sources	Earnings		OASDI		SSI	
		Mean \$	% With any	Mean \$	% With any	Mean \$	% With any
All families with OASDI benefits							
Total	\$2,837	\$2,379	74.8	\$633	100	\$238	11.8
Headed by single adult	2,126	1,837	64.4	542	100	228	13.1
Headed by couple	3,455	2,735	83.6	710	100	249	10.7
Families with only adults receiving benefits							
Total	3,085	2,582	78.9	575	100	227	18.6
Headed by single adult	2,232	1,963	69.7	486	100	208	26.0
Headed by couple	3,740	2,968	86.0	644	100	257	12.9
Families with at least one child receiving old-age or disability benefits							
Total	2,399	2,127	63.9	665	100	236	13.4
Headed by single adult	1,138	1,388	43.5	288	100	282	13.0
Headed by couple	2,994	2,333	73.5	842	100	215	13.6
Families with at least one child receiving survivors benefits							
Total	2,884	2,287	78.4	679	100	389	1.9
Headed by single adult	2,459	1,845	68.6	702	100	343	1.5
Headed by couple	3,551	2,796	93.8	642	100	432	2.6

Source: Kearney, J.R., Grundmann, H.F., and Gallicchio, S.J., 1995, *The influence of OASDI and SSI payments on the poverty status of families with children*. Social Security Bulletin 58(3):3-14.

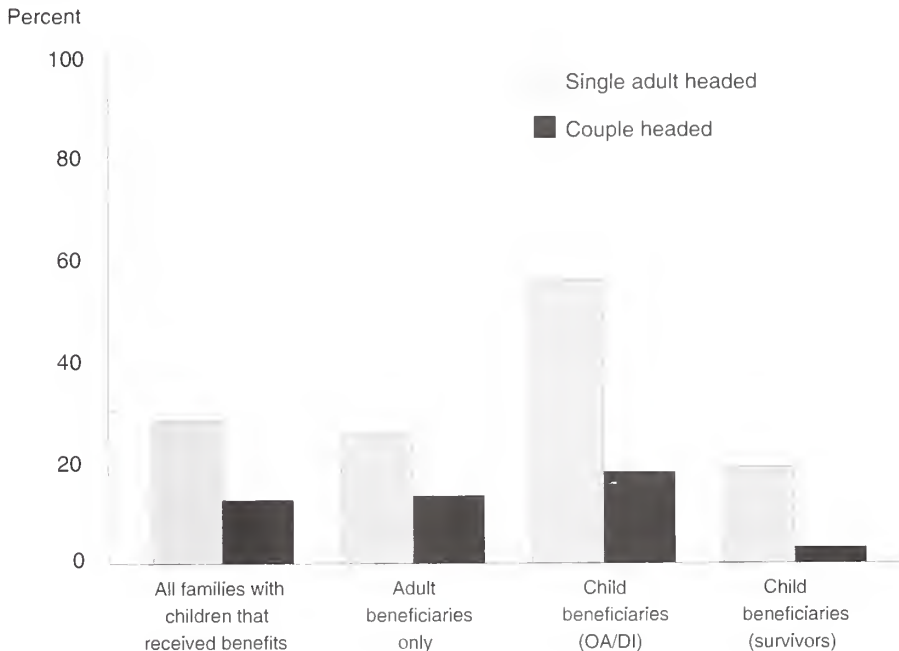
Single adult-headed families were much more likely to have income below the poverty level than families headed by a couple. Among families with a child recipient, average incomes were \$994 (single adult) and \$2,285 (couple). Among families with children where the adult was the only recipient, average incomes were \$1,380 (single adult) and \$2,472 (couple).

Among families with children that received SSI payments, those headed by a single adult that had at least one child receiving payments had 39 percent of their total income from SSI. This compares with 24 percent for families headed by a single adult but with only adult recipients, 16 percent for families headed by a couple with a child recipient, and 12 percent for families headed by a couple with only adult recipients.

Of the families with children who had only adult recipients of SSI payments, 52 percent received food stamps, 47 percent had earnings, 47 percent had income from OASDI, and 45 percent received AFDC payments. Of families with children who had at least one child receiving SSI payments, 66 percent had earnings, 42 percent received food stamps, 31 percent received AFDC payments, and 12 percent had income from OASDI.



## Poverty rates for families with children that received benefits, by type of beneficiary and family, May 1990



Source: Kearney, J.R., Grundmann, H.F., and Gallicchio, S.J., 1995, *The influence of OASDI and SSI payments on the poverty status of families with children*, *Social Security Bulletin* 58(3):3-14.

## Conclusion

The authors found that unemployment was the major reason some families that received OASDI or SSI benefits remained in poverty. Among families with OASDI benefits without earnings, the poverty rate was 72 percent for single adult-headed families and 51 percent for couple-headed families. The poverty rate was 5 percent or less for OASDI families with earnings. Among families receiving SSI benefits, the poverty rate was 78 percent for single adult-headed families and 60 percent for couple-headed families without earnings income. The poverty rate was less than 14 percent for SSI families with earnings income.

For the average family with income below the poverty line, the benefit amount would have to be more than doubled to raise their income to the poverty threshold. Thus, without substantial increases in benefits, the poorest OASDI and SSI families will not be able to escape poverty without additional income from other sources.

Source: Kearney, J.R., Grundmann, H.F., and Gallicchio, S.J., 1995, *The influence of OASDI and SSI payments on the poverty status of families with children*, *Social Security Bulletin* 58(3):3-14.

## Improving Federal Efforts to Assess Hunger and Food Insecurity

In the past, Government-sponsored surveys have not been designed to measure the extent of hunger in the United States. The most recent U.S. Department of Agriculture (USDA) evidence on this topic comes from answers to one specific question asked in its 1989-91 Continuing Survey of Food Intakes by Individuals (CSFII). The survey asked a nationally representative sample of 6,718 households which statement best described the food eaten in their household: (1) "Enough of the kinds of food we want to eat," (2) "Enough, but not always what we want to eat," (3) "Sometimes not enough to eat," or (4) "Often not enough to eat." Findings indicate that at least 2.5 percent of U.S. households sometimes or often do not get enough to eat.

Researchers have called these households "food insufficient," a term which has served as a proxy measure for hunger. This same question has been asked on various nationally representative USDA food consumption surveys since the late 1970's. Because surveys are conducted infrequently and methods have varied among surveys, it is not appropriate to infer a national trend of food sufficiency from responses to this question. However, much can be learned about the factors that underlie food sufficiency by reviewing responses reported at specific points in time.

### Characteristics of Those Who Do Not Get Enough to Eat

Since the late 1970's, between 2.5 and 3.6 percent of U.S. households sometimes or often do not get enough to eat (see table). Food insufficiency is more prevalent among low-income households (income at or below 130 percent of the poverty threshold). Between 9.4 and 11.5 percent of low-income households reported that they sometimes or often did not get enough to eat, compared with less than 1 percent of other households.

Home ownership has been consistently associated with lower rates of food insufficiency. Rates of food insufficiency are higher in larger households, in central cities, among minorities, in households headed by single persons, and in those with less education. It should be noted that these rates are descriptive in nature and do not control for underlying factors such as income.

### Estimates of Hunger Vary Widely

Various studies estimate the number of hungry people in America as low as 2 million and as high as 32 million for the 1989-91 period. This range reflects the way researchers assess and define hunger, select samples, and extrapolate survey results to the general population.

For instance, surveys conducted by USDA and the National Center for Health Statistics did not include American Indians living on reservations, the homeless, or those living in institutions. Also, USDA sample design did not include Hawaii or Alaska. If hunger rates are higher among these population groups, these Government estimates could be understated.

### Definitions of Hunger or Food Security

The President's Task Force on Food Assistance, convened in 1983 to study whether hunger was increasing, recognized that there were both medical and commonly used definitions of hunger. A medical definition relates to measures of longstanding malnutrition, such as wasting, stunting, or anemia. However, a definition that requires clinical signs measures hunger only after it has existed for an extended period—long after it may have affected the functioning of young children at school, for example. The Task Force also offered commonly used definitions of hunger, such as: "a situation in which someone cannot obtain an adequate amount of food, even if the shortage is not prolonged enough to cause health problems" and "the experience of being unsatisfied, of not getting enough to eat."

The American Institute of Nutrition defines food security as "...access by all people at all times to enough food for an active, healthy life and includes at a minimum: (1) the ready availability of nutritionally adequate and safe foods, and (2) the assured ability to acquire acceptable foods in socially acceptable ways...." Food insecurity exists whenever these conditions are limited or uncertain. Hunger and malnutrition are potential, although not necessary, consequences of food insecurity; hunger represents a severe level of food insecurity. Less severe food insecurity can be seen as an early-warning signal: a sign of problems indicating a higher risk of hunger in the future.

## Household food insufficiency, by selected demographic characteristics<sup>1</sup>

Demographic characteristics	Households reporting food insufficiency		
	1977-78	1987-88	1989-91
		<i>Percent</i>	
<b>All households</b>	<b>3.1</b>	<b>3.6</b>	<b>2.5</b>
<b>Region</b>			
Northeast	3.3	3.6	2.6
Midwest	2.1	2.2	2.2
South	4.4	4.2	2.6
West	2.2	4.3	2.6
<b>Urbanization</b>			
Central cities	5.3	5.0	3.8
Suburban	2.0	2.8	1.8
Nonmetropolitan	2.3	3.2	2.1
<b>Income (percent of poverty level<sup>2</sup>)</b>			
130 percent and under	11.5	11.0	9.4
131 - 350 percent	1.6	2.7	1.7
Over 350 percent	.2	.7	.3
<b>Tenancy</b>			
Owns home	1.3	1.7	1.0
Rents home	7.0	7.2	5.2
<b>Education (years completed)</b>			
Fewer than 9	7.6	9.6	6.4
9 - 11	6.2	6.8	5.4
12	1.8	3.3	2.3
More than 12	1.0	1.7	1.2
<b>Household type</b>			
Two-headed household	1.6	2.5	1.5
Female head only	6.8	5.1	3.7
Male head only	5.5	5.0	4.6
<b>Household size</b>			
1	4.6	4.4	2.8
2	2.0	2.2	1.7
3 - 5	2.9	3.6	2.5
6 or more	5.7	9.7	6.6
<b>Race/ethnicity</b>			
Non-Hispanic White	1.7	2.8	1.6
Non-Hispanic Black	11.1	6.6	6.5
Hispanic <sup>3</sup>	8.7	9.4	5.5
Other <sup>4</sup>	2.6	10.2	3.8

<sup>1</sup>Based on data from the Nationwide Food Consumption Surveys (1977-78, 1987-88) and the Continuing Survey of Food Intakes by Individuals (1989-91).

<sup>2</sup>Households with incomes below specific thresholds determined by the Bureau of Census are considered to be in poverty.

<sup>3</sup>May be of any race.

<sup>4</sup>"Other" includes Asians, American Indians, and others.

## New Monitoring Tool

Discrepancies in hunger estimates precipitated recent efforts to improve the way hunger in the United States is defined and monitored. A new national survey will help assess the nature and extent of hunger in America and provide detailed information on how people cope.

In April 1995, the Census Bureau, under contract with USDA's Food and Consumer Service (FCS), included a series of questions on hunger and food insecurity as a supplement to the nationally representative Current Population Survey (CPS).<sup>1</sup> These questions focused on various aspects of hunger, including food expenditures, participation in Government food-assistance programs, food scarcity, coping mechanisms, and other related issues.

People most likely to experience food insecurity were asked about their own behaviors, and also whether and how often other adults and children in the household had to skip meals, cut back on the size of meals, or go for days without eating because they could not afford enough food. There were also a number of questions about borrowing money for food, sending children to a friend's house to eat, receiving emergency food aid, or eating at soup kitchens.

The wealth of information that has been collected in the new FCS-sponsored survey presents an opportunity to obtain a much better understanding of the extent of hunger and food insecurity in the United States.

<sup>1</sup>The CPS is a monthly survey of approximately 57,000 households that obtains labor-force participation and other data.

Source: Rose, D., Basiotis, P.P., and Klein, B.W., 1995, Improving federal efforts to assess hunger and food insecurity, *FoodReview* 18(1):18-23.

## Limited Financial Resources Constrain Food Choices

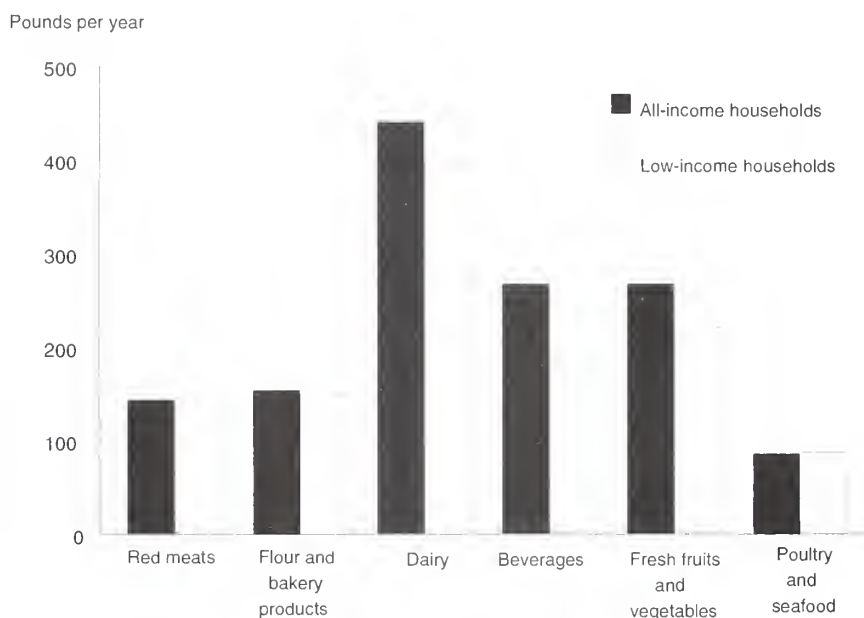
Personal income is a key factor affecting not only the amount Americans spend for food but also the types of food they buy. This article presents results from an analysis of USDA's 1987-88 Nationwide Food Consumption Survey, the latest data available on household food consumption for the population as a whole and for low-income U.S. households.

### Food Spending and Consumption

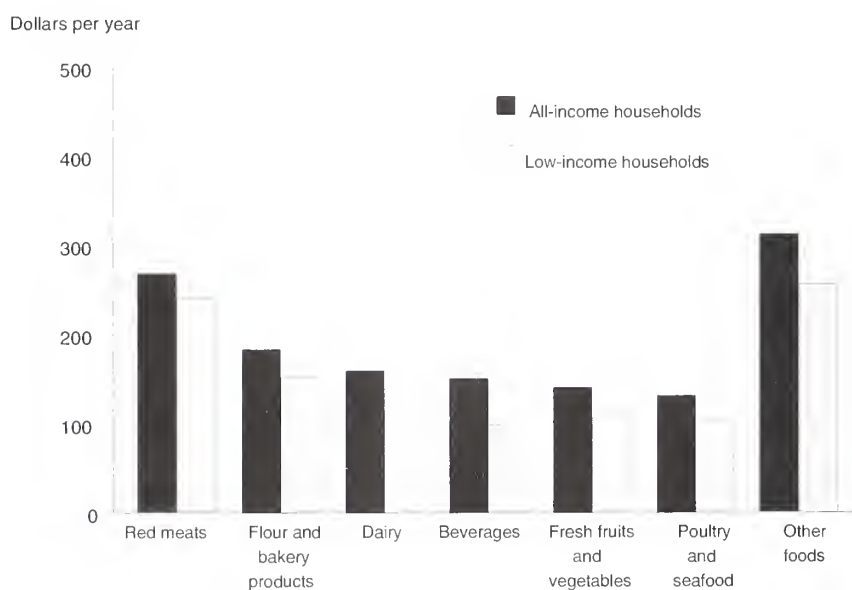
In 1987-88, food spending by low-income households was about 82 percent of the national average. Low-income households spent \$1,076 on food per person per year, whereas the population as a whole spent about \$1,348 per person.

Low-income households annually consumed about 10 percent fewer dairy products per capita than did all households, 396 pounds compared with 440 pounds (fig. 1). However, low-income households used about 9 more pounds (on a fresh-equivalent basis) of processed milk products, such as infant formula and other dried and canned milk products. The number of children in the home and participation in food-assistance programs may partially explain this difference. Low-income households averaged more children (0.98) than did the overall population (0.73). Although low-income households consumed about 10 percent fewer dairy products, they spent about 13 percent less than did the average household, suggesting that they tend to look for bargains or less expensive products (fig. 2).

**Figure 1. Food consumption per person is generally lower in low-income households**



**Figure 2. Low-income households spend less per person for major food groups**



Source: Lutz, S.M., Smallwood, D.M., and Blaylock, J.R., 1995, *Limited financial resources constrain food choices*, *FoodReview* 18(1):13-17.



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Low-income households consumed about 3 percent more red meat than did all households, but they paid about 10 percent less for the products. These results suggest that lower income households may prefer red meats more than do most households. Also, purchasing decisions by low-income households seem to be based more heavily on relative prices—leading them to shop for bargains and lower cost cuts of meat. Similarly, while low-income households ate about the same amount of poultry, fish, and shellfish as the rest of the population, they spent about 21 percent less for these products.

Low-income households buy more eggs than the national average. They spent 14 percent more and consumed 14 percent more. Such higher levels suggest that low-income households may tend to prepare more foods from scratch to economize on their food budget. The survey data on consumption and expenditures on flours, cereals, and bakery products again suggest that low-income households tend to prepare meals from scratch. Low-income households used about 11 percent more flours and cereals than did households overall. Despite their greater use, low-income households spent about 7 percent less for flour and cereals than did most households.

Low-income households consumed 21 percent less fresh fruits and 13 percent less fresh vegetables other than potatoes than the national average. On the other hand, they used about 9 percent more fresh potatoes, which are generally less expensive than other types of vegetables. Low-income households spent 25 percent less on fresh fruits and 30 percent less on fresh vegetables than the national average. They also paid less per pound,

suggesting they may buy lower cost produce items. Low-income households used about 11 percent more canned fruits and vegetables and 25 percent less frozen fruits and vegetables than did households overall, reflecting the relatively lower price of canned items.

Sugars and sweets was one of the few food groups of which low-income households ate more (12 percent) than did the population as a whole. Still, low-income households spent about 10 percent less for sugars and sweets. Most of the higher consumption can be explained by a larger use of sugar, again supporting the view that low-income households tend to make more meals and snacks from scratch instead of buying more expensive prepackaged foods. Low-income households drank about 31 percent less beverages (mainly soft drinks) than did the population as a whole. Low-income households spent slightly less per pound for soft drinks and slightly more per pound for fruit and vegetable juices.

Although eating less and spending fewer dollars does not in itself imply diminished dietary quality, the Federation of American Societies for Experimental Biology identified low-income households as a group having a higher risk of developing nutrition-related health disorders. It is clear that low-income households eat different foods than the general population, which tends to support the Federation's claim.

Households with limited financial resources tend to buy lower priced foods in search of bargains. Although low-income households appear to utilize their food dollar very effectively, there is some danger that the nutritional quality of their diets may suffer from buying few highly nutritious foods, such as fresh fruits and vegetables. Knowledge of the differences and similarities between national averages and averages for low-income Americans is critical in making effective farm and nutrition program decisions, particularly in assessing costs and benefits of welfare reform proposals on agricultural producers and needy families.

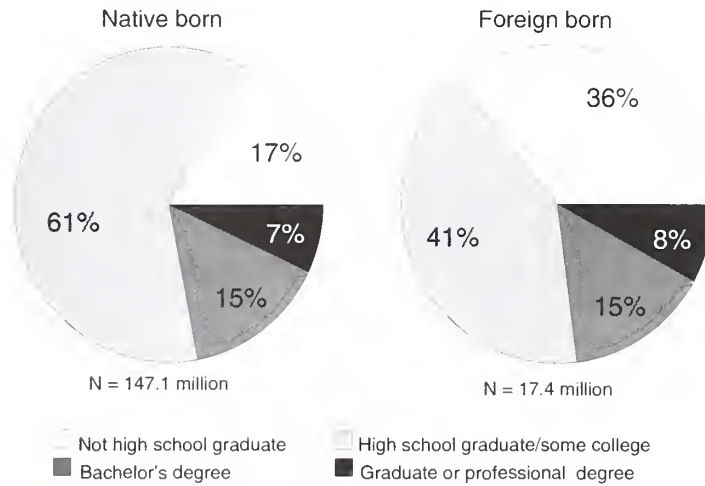
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Source: Lutz, S.M., Smallwood, D.M., and Blaylock, J.R., 1995. Limited financial resources constrain food choices, *FoodReview* 18(1):13-17.



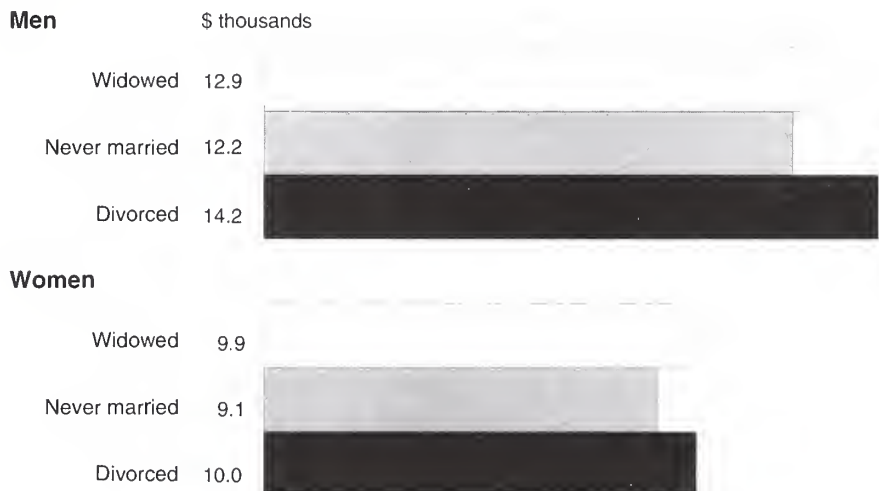
## Charts From Federal Data Sources

### Educational attainment of native-born and foreign-born U.S. residents, 25 years and older, 1994



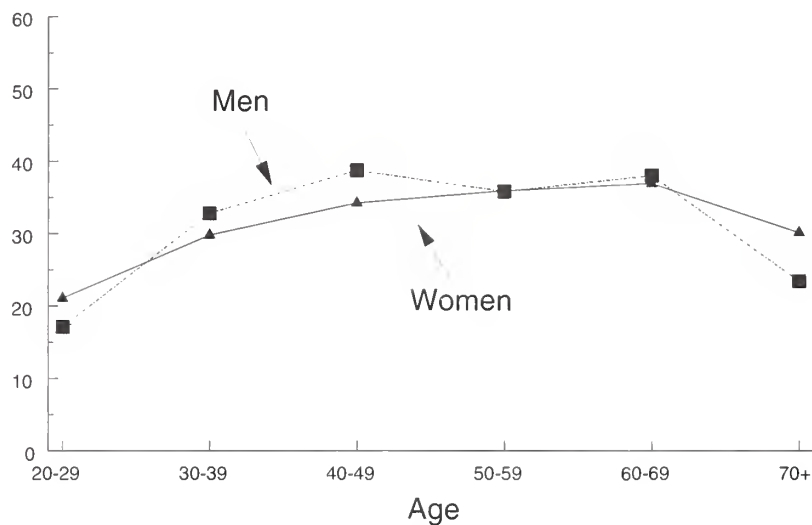
Source: Hansen, K.A. and Bachu, A., 1995, *The Foreign-Born Population: 1994, Current Population Reports, Population Characteristics, P-20-486*, U.S. Department of Commerce, Bureau of the Census.

### Median total money income of nonmarried persons, age 65 and older, 1994



Source: Grad, S., 1996, *Income of the Population 55 or Older, 1994*, SSA Publications No. 13-11871, Social Security Administration.

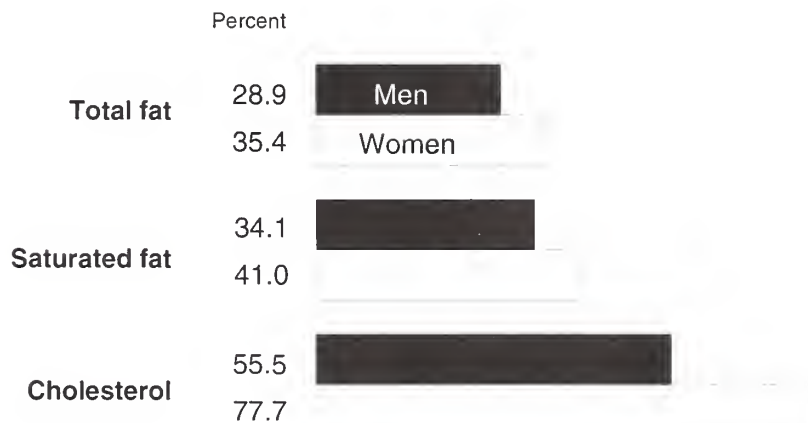
### Percentage of overweight<sup>1</sup> individuals 20 years and older, by sex and age, 1994



<sup>1</sup>Based on self-reported heights and weights. Overweight is defined as a body mass index (BMI)  $\geq 27.8$  for men and  $\geq 27.3$  for women.

Source: USDA Continuing Survey of Food Intakes by Individuals, 1994.

### Percentage of individuals 20 years and older meeting recommendations for total fat, saturated fat, and cholesterol, by sex, 2-day average, 1994



Source: USDA Continuing Survey of Food Intakes by Individuals, 1994.

## Recent Legislation Affecting Families

**Public Law 104-105 (enacted February 10, 1996)**—The Farm Credit System Reform Act of 1996 amends the Farm Credit Act of 1971 to provide regulatory relief. The law establishes a secondary market for the sale of agricultural real estate and rural housing loans and establishes new minimum capitalization standards for the Federal Agricultural Mortgage Corporation before it can enter into loans. The Corporation may voluntarily liquidate only with the consent of, and in accordance with, a plan of liquidation approved by the Farm Credit Administration Board. The new law adopts regulatory relief provisions intended to reduce borrowing costs.

**Public Law 104-113 (enacted March 7, 1996)**—The National Technology Transfer and Advancement Act of 1995 amends the Stevenson-Wydler Technology Innovation Act of 1980 with respect to inventions made under cooperative research and development agreements. The law promotes prompt deployment by U.S. industry of new discoveries created in a collaborative agreement with Federal laboratories by guaranteeing the private partner sufficient patent rights to the invention and provides financial incentives to laboratory personnel who create new inventions.

**Public Law 104-127 (enacted April 4, 1996)**—The Federal Agriculture Improvement and Reform Act of 1996 (or the so-called 1996 farm bill) establishes commodity, conservation, trade, aid, credit, research, other agriculture and food-related policies, and authorizes Federal spending for numerous U.S. Department of Agriculture (USDA) programs through the year 2002. At the

core of the farm laws are Federal programs that support farm income and some commodity prices. The 1996 law makes substantial policy changes to many of these programs. The earlier target price deficiency payment system for grains and cotton is replaced with predetermined and capped annual contract payments to participating producers through 2002. Payments are tied to overall crop history, rather than individual crops, and no longer are linked to market prices. The law reauthorizes the dairy price support program but phases it out by the end of 1999. The sugar and peanut programs are extended for 7 years, with some modifications. The new law ends Federal acreage reduction and strict planting requirements.

The trade title of the new law extends through FY 2002 authority for the Export Enhancement Program and Market Promotion Program, the dairy export incentive program, export credit guarantees, and Public Law 480 food aid programs. The conservation title of the new law builds on conservation initiatives enacted in 1985 and 1990, alters current constraints placed on producers, and converts the majority of conservation spending to entitlements by financing them with Commodity Credit Corporation funds. The law contains a rural development title that establishes a Fund for Rural America, a new community facilities grant program, and a new rural community advancement program. In addition, extensions of funding authority and revisions to agricultural research, education, and extension programs; credit; and crop insurance are also in the new law.

The food assistance title of the law extends—without change—the food stamp program through FY 1997. The Puerto Rico nutrition assistance, the Commodity Supplemental Food Program, the Emergency Food Assistance Program, and the soup kitchen and food bank program are extended through FY 2002. USDA is newly authorized to provide 50 percent matching grants for community-based food security projects to address the needs of low-income people and to foster local food self-reliance.

**Public Law 104-130 (enacted April 9, 1996)**—The Line Item Veto Act gives the President line item veto authority with respect to appropriations, new direct spending, and limited tax benefits. Title X of the Congressional Budget and Impoundment Control Act of 1974 is amended by adding line item veto authority. The President may, with respect to any bill or joint resolution that has been signed into law pursuant to Article I, section 7, of the Constitution of the United States, cancel in whole (1) any dollar amount of discretionary budget authority, (2) any item of new direct spending, or (3) any limited tax benefit—if the President determines that such cancellation will (a) reduce the Federal budget deficit, (b) not impair any essential Government functions, and (c) not harm the national interest. The President must notify the Congress of such cancellation within 5 calendar days (excluding Sundays) after the enactment of the law and provide the dollar amount of the discretionary budget authority, the item of new direct spending, or limited tax benefit that was canceled. The Congress may then “disapprove” the cancellation by passing a disapproval bill, which, in turn, may be vetoed by the President.

## Research and Evaluation Activities in USDA

### From the Food and Consumer Economics Division, Economic Research Service

#### New Report

The statistical bulletin, *Food Consumption, Prices, and Expenditures*, is published annually by the Economic Research Service. The most recent update, released in April 1996, is *Food Consumption, Prices, and Expenditures, 1996: Annual Data, 1970-94*. This report presents historical data on per capita consumption of major food commodities in the United States, including the basic data on supplies and disposition from which the consumption estimates are derived. In addition, information concerning population, income, prices, and expenditures related to food consumption provide a comprehensive and convenient source of data for statistical and economic analysis of food consumption.

The historical data on per capita consumption of major food commodities is also known as the U.S. Food Supply Series. This series measures national aggregate consumption of over 400 foods. It is the only source of time-series data on food and nutrient availability in the country. Like many series, the data are useful as indicators of trends over time. As such, this series indicates whether Americans, on average, are consuming more or less of various foods over time, and permits statistical analyses of effects of prices and incomes on consumption of these foods.

These consumption data are based on the amount of food available for human consumption in the United States and are derived by subtracting measurable uses such as exports, industrial uses, farm inputs, and end-of-year inventories from the total supply. Accordingly, the data are indirect measures of consumption and tend to overestimate what is actually consumed. Despite this limitation, the data presented in this revised bulletin are invaluable in examining trends in food consumption and expenditures by Americans since 1970.

#### Highlights on Consumption

In 1994, each American consumed, on average, 63 pounds more of commercially grown vegetables than in 1970, 49 pounds more fruit, 63 pounds more grain products, 31 pounds more poultry, 17 pounds less red meat, 71 fewer eggs, and 7 gallons less milk. Americans also consumed an average of 25 pounds more caloric sweeteners, 15 pounds more cheese, 14 pounds more fats and oils, and 4 gallons more beer.

Increased use of lowfat and skim milk instead of whole milk has been substantial. However, the overall use of milkfat did not fall, because cheese consumption increased dramatically. Per capita use of cheese has increased 53 percent since 1980. Chicken and turkey accounted for 33 percent of the total meat consumed by Americans in 1994, up from 23 percent in 1980 and 19 percent in 1970. Red meat accounted for 59 percent of total meat consumed in 1994, compared with 70 percent in 1980 and 74 percent in 1970.

Per capita use of caloric sweeteners reached an all-time high in 1994, with Americans consuming, on average, 148 pounds of refined and processed sugars, 20 percent more than in 1980.

Annual per capita consumption of regular (nondiet) carbonated soft drinks rose 43 percent between 1986 and 1994, to 40.3 gallons (equal to 645 8-ounce servings). Annual per capita consumption of candy was up 6 pounds from 1980, to 22.1 pounds per person in 1994.

Spice consumption, per capita, totaled a record 2.7 pounds in 1994, up by nearly 1 pound from a decade earlier. The growth in spice consumption reflects a trend toward the use of spices to compensate for less salt and lower fat levels in foods, as well as the increased popularity of ethnic foods from Asia, Mediterranean countries, and Latin America.

While these data suggest Americans are eating more grains, especially in mixtures, they are still not eating the amounts of high-fiber foods, including whole-grain products, legumes, vegetables, and fruit, that are recommended in the 1995 *Dietary Guidelines for Americans*. Also, they are eating more foods that contain large amounts of refined sugars.

#### Highlights on Food Expenditures

Americans spent \$647 billion for food in 1994 and another \$86 billion for alcoholic beverages. Away-from-home meals and snacks captured 47 percent of the U.S. food dollar in 1994, up from 34 percent in 1970. The percentage of

disposable personal income spent on food declined from 13.9 percent in 1970 to 11.4 percent in 1994.

Food prices, as measured by the Consumer Price Index (CPI), increased 2.4 percent in 1994. The increase was less than the overall increase in the CPI for the fourth consecutive year. Food prices in 1994 rose more at supermarkets and other grocery stores (2.9 percent) than at away-from-home eating places (1.7 percent). Grocery store prices advanced faster in 1994 than in 1993, reflecting higher prices for coffee, fresh fruits, seafood, cereal, bakery products, and processed vegetables. These price increases were mitigated by lower beef prices and modest price increases for most other commodities.

**For information on obtaining this report:**

Call toll free in the United States and Canada, 1-800-999-6779. In other areas, call 1-703-834-0125. The cost is \$15.00 per copy (\$18.75 for non-U.S. addresses, including Canada). Charge to Visa or MasterCard or send a check (payable to ERS-NASS) to ERS-NASS, 341 Victory Drive, Herndon, VA 22070.

Data are available in electronic form as Lotus 1-2-3 (.WK1) worksheet files on DOS-compatible, 3.5" diskettes. Call toll free in the United States and Canada, 1-800-999-6779. In other areas, call 1-703-834-0125. Ask for **Food Consumption**, stock #89015B, \$35.00.

The data are also available on the worldwide Internet. For access:

1. World Wide Web URL—  
<http://usda.mannlib.cornell.edu/usda>
2. Gopher client—gopher  
[usda.mannlib.cornell.edu](http://usda.mannlib.cornell.edu) 70
3. Telnet—telnet [usda.mannlib.cornell.edu](http://usda.mannlib.cornell.edu)  
and login as "usda"
4. FTP—ftp [usda.mannlib.cornell.edu](http://usda.mannlib.cornell.edu),  
login as "anonymous" with your  
ID name or e-mail address as the  
password, then cd usda / reports.

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**Would you like to publish in *Family Economics and Nutrition Review*?**

*Family Economics and Nutrition Review* will consider for publication articles concerning economic and nutritional issues related to the health and well-being of families. We are especially interested in studies about U.S. population groups at risk—from either an economic or nutritional perspective. Research may be based on primary or secondary data as long as it is national or regional in scope or of national policy interest, and articles may use descriptive or econometric techniques. Manuscripts may be mailed to: Joan C. Courtless, Editor, Center for Nutrition Policy and Promotion. See guidelines on p. 71 for complete address.



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## Data Sources

### Total Diet Study (TDS)

**Sponsoring agency:** U.S. Department of Health and Human Services

**Population covered:** Specific age-sex groups (6 to 11-month-old infants; 2-, 6-, and 10-year-old children; 14 to 16-year-old females and males; 25 to 30-year-old females and males; 40 to 45-year-old females and males; 60 to 65-year-old females and males; and females and males 70 years and over).

**Sample size:** No individuals are sampled.

**Geographic distribution:** The foods for the study are collected by inspectors from Food and Drug Administration district offices in various regions of the country.

**Years data collected:** Annually since 1961.

**Method of data collection:** Core foods of the U.S. food supply are purchased from retail markets and restaurants, prepared for consumption, and analyzed in the laboratory for nutrients and contaminants four times each year. The diets used since 1991 include 265 foods. Representative diets of the selected age-sex groups are developed based on national food consumption data. The food composition data are merged with the food consumption data to estimate daily intake of the nutrients and contaminants. Results from the four collections are averaged and the yearly results are compared with prior data to determine trends over time.

**Future surveys planned:** 1991-96 results will be available approximately October 1996.

**Major variables:** The Total Diet Study provides the Food and Drug Administration with baseline information on the levels of pesticide residues, contaminants, and nutrient elements in the food supply and in the diets of specific age-sex groups. The study also identifies trends and changes in the levels of these substances in the food supply and in diets over time and thereby assists in identifying potential public health problems.

#### Sources for further information and data:

National Institutes of Health  
Division of Nutrition Research  
Coordination  
Natcher Building  
Building 45, Room 5AN-32  
45 Center Drive, MSC 6600  
Bethesda, MD 20892-6600  
(301) 594-8822

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### 5 A Day for Better Health Baseline Survey

**Sponsoring agency:** U.S. Department of Health and Human Services and the Produce for Better Health Foundation

**Population covered:** Americans age 18 and over, with an oversampling of Black Americans and Hispanics.

**Sample size:** 2,837

**Geographic distribution:** Nationwide

**Years data collected:** August 10 through September 22, 1991.

**Method of data collection:** Telephone interviews.

**Future surveys planned:** A follow-up survey will be conducted in late summer 1996. Results will be available approximately February 1998.

**Major variables:** The study was conducted to assess current fruit and vegetable consumption, as well as awareness, knowledge, and attitudes about diet and nutrition issues, prior to the start of the national 5 A Day program. For 33 fruits and vegetables: number of times per day, week, month, or year they were

eaten; total number of servings of fruits and vegetables eaten per day or per week; number of adults in household, gender, age, education, and race.

#### Sources for further information and data:

National Institutes of Health  
National Cancer Institute  
Executive Plaza North, Room 313  
6130 Executive Blvd., MSC 7344  
Bethesda, MD 20892-7344  
(301) 496-8500

## Journal Abstracts

The following abstracts are reprinted verbatim as they appear in the cited source.

Garand, J.C. and Monroe, P.A. 1995. Family leave legislation in the American States: Toward a model of State policy adoption. *Journal of Family and Economic Issues* 16(4):341-364.

The issue of mandated family leave has drawn substantial attention in recent years. This article develops and tests empirically a model of adoption of family leave policies in the American states during the late 1980s. State family leave policies are seen as a function of three sets of variables: (a) institutional-elite variables such as partisan control of state government and the proportion of women in the state legislatures; (b) constituency disposition variables such as mass partisanship, mass ideology, and the likelihood of general support for "women's" issues; and (c) contextual-demand variables such as birth rates and women's participation in the workforce. The model provides impressive fit to the data, accurately predicting the family leave policies of 92% of the state cases. The results suggest the importance of partisan control of state government, proportion of women in the state legislature, urbanization, and feminism as a state policy as factors that affect the probability that states will adopt mandated family leave policies.

Krebs-Smith, S.M., Cook, D.A., Subar, A.F., Cleveland, L., and Friday, J. 1995. US adults' fruit and vegetable intakes, 1989 to 1991: A revised baseline for the *Healthy People 2000* objective. *American Journal of Public Health* 85(12):1623-1629.

*Objectives.* This study provides revised baseline data for the *Healthy People 2000* objective related to fruit and vegetable intakes, accounting for fruits and vegetables from all sources and measuring servings in a manner consistent with current dietary guidance.

*Methods.* Dietary data from 8181 adults in the US Department of Agriculture's 1989-1991 Continuing Surveys of Food Intakes by Individuals were examined. All foods were disaggregated into their component ingredients; all fruit and vegetable ingredients were assigned specific weights to correspond to a serving as defined by current dietary guidance materials; and the number of servings was tallied.

*Results.* While mean intakes of fruits and vegetables—4.3 servings per day—were not far from the Year 2000 objective, only 32% of American adults' intakes met the objective. When more stringent standards were set either to compensate for higher calorie levels or to achieve the balance between fruits and vegetables suggested in current guidance, only 24% and 12%, respectively, met the recommendations.

*Conclusions.* These results suggest a need to develop strategies for overcoming barriers to eating fruits and vegetables.

Reynolds, J.S., Kennon, L.R., and Palakurthi, R. 1995. Parents' perceptions of fast food consumption by children. *Journal of Family and Consumer Sciences* 87(4):39-44.

The purpose of this study was to identify the effects of eight sociodemographic factors—age, marital status, gender, ethnicity, education, income level, income generation, and number of children—on parents' perceptions of fast food consumption by children. A Q-sort instrument was developed and administered to 250 parents to determine presumed reasons for fast food patronage, parental responsibility for providing healthy food choices for children and children's influence on fast food selection. A total of 187 parents with children under age 12 participated in the study. Results show that among the 60 perception statements considered, the parents strongly agreed or disagreed with nutrition-related statements most. Even though fast food patronage by children and families is continuing to increase, nutrition is an important consideration for parents. This research was supported by funds from the American Association of Family and Consumer Sciences Massachusetts Avenue Building Fund Assets Grant.

# Poverty Thresholds

Weighted average poverty thresholds<sup>1</sup> for nonfarm families of specified size, 1965–95

Calendar year	Unrelated individuals			Families of 2 persons or more							Annual average CPI, all items (1982–84 = 100)
				2 persons			3 persons	4 persons	5 persons	6 persons	
	All ages	Under age 65	Age 65 or older	All ages	Householder under age 65	Householder age 65 or older					
1965	\$1,582	\$1,626	\$1,512	\$2,048	\$2,114	\$1,906	\$2,514	\$3,223	\$3,797	\$4,264	31.5
1966	1,635	1,685	1,565	2,115	2,185	1,970	2,600	3,335	3,930	4,410	32.5
1967	1,675	1,722	1,600	2,168	2,238	2,017	2,661	3,410	4,019	4,516	33.4
1968	1,748	1,797	1,667	2,262	2,333	2,102	2,774	3,553	4,188	4,706	34.8
1969	1,840	1,893	1,757	2,383	2,458	2,215	2,924	3,743	4,415	4,958	36.7
1970	1,954	2,010	1,861	2,525	2,604	2,348	3,099	3,968	4,680	5,260	38.8
1971	2,040	2,098	1,940	2,633	2,716	2,448	3,229	4,137	4,880	5,489	40.5
1972	2,109	2,168	2,005	2,724	2,808	2,530	3,339	4,275	5,044	5,673	41.8
1973	2,247	2,307	2,130	2,895	2,984	2,688	3,548	4,540	5,358	6,028	44.4
1974	2,495	2,562	2,364	3,211	3,312	2,982	3,936	5,038	5,950	6,699	49.3
1975	2,724	2,797	2,581	3,506	3,617	3,257	4,293	5,500	6,499	7,316	53.8
1976	2,884	2,959	2,730	3,711	3,826	3,445	4,540	5,815	6,876	7,760	56.9
1977	3,075	3,152	2,906	3,951	4,072	3,666	4,833	6,191	7,320	8,261	60.6
1978	3,311	3,392	3,127	4,249	4,383	3,944	5,201	6,662	7,880	8,891	65.2
1979	3,689	3,778	3,479	4,725	4,878	4,390	5,784	7,412	8,775	9,914	72.6
1980	4,190	4,290	3,949	5,363	5,537	4,983	6,565	8,414	9,966	11,269	82.4
1981	4,620	4,729	4,359	5,917	6,111	5,498	7,250	9,287	11,007	12,449	90.9
1982	4,901	5,019	4,626	6,281	6,487	5,836	7,693	9,862	11,684	13,207	96.5
1983	5,061	5,180	4,775	6,483	6,697	6,023	7,938	10,178	12,049	13,630	99.6
1984	5,278	5,400	4,979	6,762	6,983	6,282	8,277	10,609	12,566	14,207	103.9
1985	5,469	5,593	5,156	6,998	7,231	6,503	8,573	10,989	13,007	14,696	107.6
1986	5,572	5,701	5,255	7,138	7,372	6,630	8,737	11,203	13,259	14,986	109.6
1987	5,778	5,909	5,447	7,397	7,641	6,872	9,056	11,611	13,737	15,509	113.6
1988	6,024	6,155	5,674	7,704	7,958	7,158	9,435	12,092	14,305	16,149	118.3
1989	6,311	6,451	5,947	8,076	8,343	7,501	9,885	12,675	14,990	16,921	124.0
1990	6,652	6,800	6,268	8,512	8,794	7,906	10,419	13,360	15,800	17,835	130.7
1991	6,932	7,086	6,532	8,867	9,164	8,238	10,857	13,921	16,457	18,590	136.2
1992	7,141	7,299	6,729	9,132	9,441	8,489	11,187	14,343	16,951	19,146	140.3
1993	7,357	7,517	6,930	9,410	9,726	8,741	11,521	14,764	17,459	19,710	144.5
1994	7,551	7,710	7,107	9,655	9,977	8,964	11,817	15,141	17,896	20,223	148.2
1995 <sup>2</sup>	7,761	7,929	7,309	9,935	10,259	9,221	12,156	15,570	18,407	20,808	152.4

<sup>1</sup>The **poverty thresholds** are used by the Bureau of the Census to prepare its statistical estimates of the number of individuals and families in poverty. The **poverty guidelines** are a simplified version of these poverty thresholds and are issued by the Department of Health and Human Services for administrative purposes. The poverty guidelines are used to determine whether a person or family is financially eligible for assistance or services under a particular Federal program.

<sup>2</sup>Preliminary data: 1994 weighted average poverty levels raised by 2.8 percent to correspond with the 1995 increase from the 1994 Consumer Price Index (CPI-U) for all urban consumers.

# Cost of Food at Home

Cost of food at home estimated for food plans at four cost levels, June 1996, U.S. average<sup>1</sup>

Sex-age group	Cost for 1 week				Cost for 1 month			
	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan
<b>FAMILIES</b>								
Family of 2: <sup>2</sup>								
20 - 50 years . . . . .	\$55.20	\$69.50	\$85.80	\$106.80	\$239.30	\$301.40	\$371.80	\$462.40
51 years and over . . . . .	51.90	66.90	82.60	99.00	225.10	289.70	357.90	429.10
Family of 4:								
Couple, 20 - 50 years and children—								
1 - 2 and 3 - 5 years . . . . .	80.40	100.30	122.70	151.00	348.40	434.90	531.80	653.90
6 - 8 and 9 - 11 years . . . . .	92.40	118.10	147.40	177.70	400.50	512.20	638.70	769.30
<b>INDIVIDUALS<sup>3</sup></b>								
Child:								
1 - 2 years . . . . .	14.50	17.70	20.80	25.20	62.80	76.90	90.00	109.10
3 - 5 years . . . . .	15.70	19.40	23.90	28.70	68.10	84.00	103.80	124.40
6 - 8 years . . . . .	19.30	25.70	32.10	37.30	83.60	111.50	138.90	161.50
9 - 11 years . . . . .	22.90	29.20	37.30	43.30	99.40	126.70	161.80	187.40
Male:								
12 - 14 years . . . . .	23.70	33.00	40.90	48.10	102.90	143.10	177.30	208.60
15 - 19 years . . . . .	24.50	34.00	42.30	49.00	106.30	147.30	183.30	212.20
20 - 50 years . . . . .	26.40	33.70	42.10	51.10	114.50	146.10	182.50	221.20
51 years and over . . . . .	23.80	32.20	39.60	47.50	103.30	139.40	171.50	205.80
Female:								
12 - 19 years . . . . .	23.70	28.40	34.50	41.60	102.80	123.20	149.30	180.40
20 - 50 years . . . . .	23.80	29.50	35.90	46.00	103.00	127.90	155.50	199.20
51 years and over . . . . .	23.40	28.60	35.50	42.50	101.30	124.00	153.90	184.30

<sup>1</sup> Assumes that food for all meals and snacks is purchased at the store and prepared at home. Estimates for the thrifty food plan were computed from quantities of foods published in *Family Economics Review* 1984(1). Estimates for the other plans were computed from quantities of foods published in *Family Economics Review* 1983(2). The costs of the food plans are estimated by updating prices paid by households surveyed in 1977-78 in USDA's Nationwide Food Consumption Survey. USDA updates these survey prices using information from the Bureau of Labor Statistics, *CPI Detailed Report*, table 4, to estimate the costs for the food plans.

<sup>2</sup> Ten percent added for family size adjustment. See footnote 3.

<sup>3</sup> The costs given are for individuals in 4-person families. For individuals in other size families, the following adjustments are suggested: 1-person—add 20 percent; 2-person—add 10 percent; 3-person—add 5 percent; 5- or 6-person—subtract 5 percent; 7- or more-person—subtract 10 percent.



# Consumer Prices

Consumer Price Index for all urban consumers [1982-84 = 100]

Group	Unadjusted indexes			
	June 1996	May 1996	April 1996	June 1995
All items . . . . .	156.7	156.6	156.3	152.5
Food . . . . .	152.6	152.0	152.3	147.9
Food at home . . . . .	153.4	152.6	153.3	148.1
Food away from home . . . . .	152.3	152.0	151.6	148.8
Housing . . . . .	152.7	152.0	151.8	148.5
Shelter . . . . .	170.7	170.1	170.1	165.5
Renters' costs <sup>1</sup> . . . . .	180.0	178.9	179.7	174.7
Homeowners' costs <sup>1</sup> . . . . .	176.0	175.6	175.3	170.6
Household insurance <sup>1</sup> . . . . .	160.7	159.5	159.4	158.1
Maintenance and repairs . . . . .	138.8	138.8	138.0	135.0
Maintenance and repair services . . . . .	144.6	144.7	143.8	139.4
Maintenance and repair commodities . . . . .	130.9	130.9	130.0	129.0
Fuel and other utilities . . . . .	128.4	126.7	125.4	125.0
Fuel oil and other household fuel commodities . . . . .	94.6	99.6	102.1	87.9
Gas (piped) and electricity . . . . .	124.1	120.6	118.9	121.9
Household furnishings and operation . . . . .	124.5	124.4	124.8	122.5
Housefurnishings . . . . .	111.2	111.2	111.9	110.7
Apparel and upkeep . . . . .	130.8	133.7	134.9	130.5
Apparel commodities . . . . .	127.2	130.4	131.7	127.1
Men's and boys' apparel . . . . .	127.1	129.5	129.0	125.5
Women's and girls' apparel . . . . .	122.8	127.7	130.2	124.4
Infants' and toddlers' apparel . . . . .	129.1	130.4	133.7	121.6
Footwear . . . . .	127.1	128.3	128.2	124.6
Apparel services . . . . .	159.7	159.4	158.8	156.9
Transportation . . . . .	144.0	144.4	143.1	141.1
Private transportation . . . . .	141.0	141.7	140.3	137.9
New vehicles . . . . .	143.5	143.4	143.5	141.0
Used cars . . . . .	157.2	157.6	157.4	158.3
Motor fuel . . . . .	111.2	113.6	108.6	106.1
Maintenance and repairs . . . . .	157.7	157.5	157.2	153.6
Other private transportation . . . . .	173.1	173.1	173.0	169.9
Public transportation . . . . .	182.2	180.2	179.3	182.5
Medical care . . . . .	227.8	227.4	227.0	219.8
Medical care commodities . . . . .	210.5	209.7	209.6	203.8
Medical care services . . . . .	231.9	231.6	231.1	223.5
Professional medical services . . . . .	207.9	207.7	207.0	200.8
Entertainment . . . . .	159.0	158.8	158.6	153.2
Entertainment commodities . . . . .	142.9	142.8	142.8	138.1
Entertainment services . . . . .	177.9	177.6	177.2	171.2
Other goods and services . . . . .	214.0	214.1	213.3	205.3
Personal care . . . . .	149.6	150.3	149.7	146.7
Toilet goods and personal care appliances . . . . .	143.9	145.3	144.2	142.8
Personal care services . . . . .	155.9	155.8	155.7	151.0
Personal and educational expenses . . . . .	245.1	244.8	244.6	232.5
School books and supplies . . . . .	224.7	224.7	225.5	212.7
Personal and educational services . . . . .	246.8	246.6	246.3	234.2

<sup>1</sup>Indexes on a December 1982 = 100 base.

Source: U.S. Department of Labor, Bureau of Labor Statistics.

# Errata

Volume 9, Number 1, page 20. Correct figures for education are below.

**Table 3. Household characteristics and macroeconomic factors in the United States, 1989**

State	Female's labor force participation	Dependency ratio	Education	Industry	Unemployment rate	Government assistance
Alabama	45.5	64.3	66.9	77.9	6.9	2,985
Alaska	41.7	54.8	86.6	17.7	8.8	4,934
Arizona	44.6	66.2	78.7	37.2	7.2	3,711
Arkansas	45.8	70.4	66.3	77.6	6.8	2,901
California	43.4	56.7	76.2	50.6	6.6	5,972
Colorado	45.4	56.6	84.4	36.3	5.7	3,638
Connecticut	46.2	57.2	79.2	62.6	5.4	4,864
Delaware	46.8	57.8	77.5	60.2	4.0	4,012
District of Columbia	50.8	47.3	73.1	9.3	7.2	3,927
Florida	45.8	68.0	74.4	31.0	5.8	3,803
Georgia	46.2	58.1	70.9	64.3	5.7	3,210
Hawaii	44.3	57.6	80.1	17.3	3.5	5,272
Idaho	43.5	74.5	79.7	48.2	6.1	3,321
Illinois	45.4	62.2	76.2	61.0	6.6	3,925
Indiana	45.6	63.4	75.6	85.6	5.7	3,613
Iowa	46.0	70.2	80.1	54.7	4.5	3,784
Kansas	45.0	68.1	81.3	50.5	4.7	3,740
Kentucky	44.4	62.7	64.6	65.1	7.4	3,282
Louisiana	44.8	67.2	68.3	36.5	9.6	3,114
Maine	45.7	62.5	78.8	60.7	6.6	3,557
Maryland	46.9	54.1	78.4	29.2	4.3	3,915
Massachusetts	47.0	56.5	80.0	49.6	6.7	4,711
Michigan	45.4	62.3	76.8	77.4	8.2	4,369
Minnesota	46.3	64.4	82.4	54.2	5.1	4,426
Mississippi	46.4	71.0	64.3	79.4	8.4	2,800
Missouri	46.1	65.9	73.9	58.8	6.2	3,314
Montana	44.8	69.8	81.0	22.0	7.0	3,620
Nebraska	45.9	70.4	81.8	39.6	3.7	3,729
Nevada	44.0	54.6	78.8	13.3	6.2	3,908
New Hampshire	46.3	57.2	82.2	72.7	6.2	3,722
New Jersey	45.8	51.8	76.7	50.9	5.7	4,298
New Mexico	44.2	67.4	75.1	22.9	8.0	3,325
New York	46.3	58.3	74.8	39.0	6.9	4,469
North Carolina	46.2	57.1	70.0	95.6	4.8	3,143
North Dakota	44.5	71.5	76.7	17.8	5.3	3,688
Ohio	45.5	63.3	75.7	73.8	6.6	3,736
Oklahoma	44.7	66.9	74.6	43.6	6.9	3,279
Oregon	44.8	64.6	81.5	55.1	6.2	3,798
Pennsylvania	45.3	63.7	74.7	61.3	6.0	4,041
Rhode Island	46.7	60.0	72.0	69.6	6.6	4,503
South Carolina	46.3	60.7	68.3	91.1	5.6	3,111
South Dakota	45.5	76.1	77.1	32.6	4.2	3,261
Tennessee	45.9	60.3	67.1	79.3	6.4	3,035
Texas	44.0	62.8	72.1	44.3	7.1	3,011
Utah	44.0	82.2	85.1	45.9	5.3	3,733
Vermont	46.5	59.2	80.8	44.3	5.9	3,966
Virginia	45.4	54.0	75.2	46.5	4.5	3,394
Washington	44.2	60.6	83.8	54.9	5.7	4,489
West Virginia	42.6	56.9	66.0	46.0	9.6	3,545
Wisconsin	46.1	65.7	78.6	81.9	5.2	4,356
Wyoming	43.8	67.4	83.0	18.5	5.9	3,410

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